4.4 HYDROLOGY, WATER RESOURCES, AND WATER QUALITY

This section addresses issues involving potential impacts on hydrology, water resources, and water quality resulting from the proposed expansion of oil development from Platform Holly and the installation of a new pipeline from the EOF connecting to the AACP at Las Flores Canyon (LFC). The environmental setting provides information on existing water quality characteristics of the Santa Barbara Channel and onshore, between the EOF and LFC. This impact evaluation also addresses the potential effects on water resources from the principal alternatives to the proposed Project (Table 3.1). Potential cumulative impacts on water quality in the region are identified, along with potential mitigation measures.

4.4.1 Environmental Setting

This section characterizes the marine environment, including oceanographic processes and marine water quality, as well as onshore hydrology and water quality.

Regional Oceanographic Processes

A wide variety of oceanographic and meteorological processes affect the fate and effects of contaminants introduced into the marine environment. As described in Section 4.2, Hazards and Hazardous Materials, surface winds and surface currents dictate the transport of oil accidentally spilled into the marine environment. This includes spills that occur in conjunction with expanded drilling activities on Platform Holly, and with the operation of seafloor pipelines. Subsurface releases of petroleum hydrocarbons rapidly rise to the sea surface, and spill-related water-quality impacts tend to be localized at the sea surface. Conversely, potential water-quality impacts from marine construction activities, such as sand-jetting, tend to have a greater subsurface affect. Close to shore, turbulence generated by shoaling surface gravity waves mixes contaminants throughout the water column.

Ocean current flow within the northern Santa Barbara Channel is fairly well understood, as compared to many other coastal areas. This advanced understanding resulted largely from a single large oceanographic program conducted to provide site-specific information to improve oil-spill transport models, such as the OSRA and GNOME models that were applied in Section 4.2, Hazards and Hazardous Materials. Under the auspices of the MMS, Scripps Institution of Oceanography began a multi-year observational study in 1991 to characterize the general circulation within the Santa

Barbara Channel, and within the Santa Maria Basin, which lies just north of Point Arguello. As a result of that study, modeling of oil-spill trajectories within the Santa Barbara Channel significantly improved. The field measurements included current-meter moorings, surface drifters, and hydrographic transects (Figure 4.4-1). Results have been summarized by Dever (1998), Harms and Winant (1998), Hendershott and Winant (1996), and Winant et al. (1999).

Figure 4.4-1
Location of Current-Meter Moorings, Buoys, and the Ellwood EIR Offshore Survey Area within the Santa Barbara Channel

Source: Adapted from http://www.sccoos.org/data/bathy/?r=2 and accessed September 12, 2007

Beyond the improvements to oil-spill trajectory models, some of the study's measurements are especially pertinent to the proposed Project because of their proximity to Platform Holly. Platform Holly lies four nautical miles (nm [7.4 km]) shoreward and west of one of the long-term current meter moorings, GOIN (Goleta Inshore). In addition, a National Oceanic and Atmospheric Administration (NOAA) Data Buoy Center (NDBC) site, designated NDBC53, is located ten nm (18.5 km) southeast of the Platform. Buoy NDBC53 was fitted with an acoustic-Doppler current meter capable of continuously measuring a vertical profile of horizontal velocity.

In addition to the MMS study, surface currents are regularly mapped using high-frequency radar data as part of the Coastal Ocean Currents Monitoring Program (COCMP). The Project is funded by California State Coastal Conservancy and the State Water Resources Control Board (SWRCB). Furthermore, surface-current data within the Santa Barbara Channel have been extensively analyzed in a variety of marine biological and physical oceanographic studies (Beckenbach 2004; Bassin et al 2005; Emery et al 2006; Cudaback et al 2005; Nishimoto and Washburn 2002). Data from the radar array is used in two major marine ecological projects at UCSB. The first project is the Santa Barbara Coastal Long Term Ecological Research Project (SBC-LTER) that investigates the influence of land and ocean processes in giant kelp forest ecosystems. A second project is the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO), whose goal is to determine the processes underlying the dynamics of the coastal ecosystems along the U.S. west coast, especially with regard to marine reserves.

Figure 4.4-2 shows a radar-derived flow pattern in the Santa Barbara Channel taken at the time of the water-quality survey conducted as part of this EIR. A series of winter storms prior to the survey brought unsettled ocean conditions and added to the complexity of the surface flow pattern shown in the image. Strong westward winds prevailed during much of the survey and a severe weather advisory was issued for marine waters. The surface flow pattern exhibited a number of localized eddies and flow convergences.

To add to the complexity of the region, studies indicate that oceanic processes operating at distant locations outside the Channel exert their influence on both the flow and the seawater properties within the Channel. For example, offshore seawater properties are carried into the region via a major ocean current that traverses the North Pacific Ocean. Well offshore of the Santa Barbara Channel (more than 62 miles [100 km]), the diffuse southward-flowing California Current represents the eastern limb of the clockwise-flowing gyre that covers much of the North Pacific Basin. Subarctic water, before turning south to form the California Current, is carried along at high latitudes, where it is exposed to precipitation, atmospheric cooling, and nutrient regeneration. As a result, waters of the California Current are characterized by a seasonably stable low salinity (32 to 34 parts per thousand), a low temperature of approximately 55°F to 68°F (13°Celsius to 20°Celsius), and high nutrient concentrations. Waters within the California Current also undergo less seasonal variation than surface waters at similar latitudes along the eastern seaboard.

Figure 4.4-2
Surface Currents at 11:00 PST on 31 January 2007 during the EIR Water Quality Survey

Source: Adapted from http://www.sccoos.org/data/hfrnet/?r=2 and accessed September 12, 2007

Immediately shoreward of the southern portion of the California Current, along the continental slope and shelf, is the northward-flowing Davidson countercurrent that carries warm, saline, and less oxygenated waters up the coast from the Southern California Bight. These waters generally extend westward along the southern coastline of the Channel Islands or enter the Santa Barbara Channel at its eastern entrance, as shown in red in Figure 4.4-3. The width of the countercurrent is typically 6.2 miles (mi) to 12 m (10 km to 19.3 km) with velocities less than one foot per second (ft/s) or 0.3 meters/second (m/s). However, the countercurrent is broader and stronger in the winter when it occasionally covers the entire continental shelf, as is the case in Figure 4.4-2 when winter conditions increased the flow rate of the Davidson countercurrent within the Santa Barbara Channel.

Figure 4.4-3
Sea Surface Temperatures within the Santa Barbara Channel

The warm waters of the Davidson countercurrent exhibit a strong seasonal variability in intensity that coincides with large-scale changes in coastal winds. Throughout much of the year, an alongshore oceanographic pressure gradient generally maintains a westward flow through the eastern Santa Barbara Channel entrance, and along its northeastern reaches (MMS 2001). However, throughout most of the year, opposing winds blow from the northwest, parallel to the central California coast. The Davidson Current is strongest when these opposing northwesterly winds relax between December and February.

Starting between March and June, a rapid transition to strong northwesterly winds occurs. Figure 4.4-3 depicts the resulting pattern of sea surface temperatures that is typical of this spring transition. Along the central California coast north of Point Conception, the winds transport surface water near the coast offshore and down-coast. The surface waters are replaced by deep cool, nutrient-rich seawater in a process known as upwelling. The cool water up-welled near the coast is delineated in blue in the Figure. The nutrients brought to the surface during upwelling drives primary production (phytoplankton development) that is the hallmark of the productive fishery along the central California coast. Within the Santa Barbara Channel, intensification of the southeastward winds drives an eastward flow within the Channel, with the strongest currents in the southern portion, just north of the Channel Islands.

Currents within the Santa Barbara Channel arise from both externally driven flows and a counterclockwise circulation that is generally restricted to the Channel's interior. Consequently, surface currents on the northern shelf near the Platform Holly are predominantly westward throughout the year, with maximum flows during the summer and early fall, when the Davidson countercurrent is strongest. Monthly average flows reach three knots (three nm/hr [1.6 m/sec]) during most of the year.

In contrast to the westward flows in the northern channel, average currents along the southern Channel shelf, near the Channel Islands, are eastward year-round and reach a maximum during the spring, when the large-scale flow through the eastern Santa Barbara Channel entrance is also eastward. The countercurrents that reside on the north and south sides of the Channel form a counterclockwise cyclone throughout much of the year.

Superimposed on these average currents are six temporary flow patterns that prevail at various times (Figure 4.4-4). In all but one of these scenarios, Flood East, which is depicted in Figure 4.4-4(e), the flow at the Platform Holly is toward the west. The Flood East pattern occurs when the alongshore pressure gradient and the wind stress are acting to cause the flow everywhere in the Santa Barbara Channel to move toward the east. However, this flow regime does not last very long, is not particularly strong, and typically occurs in the winter. The eastward surface flow observed near Platform Holly in Figure 4.4.-2 was unrelated to this kind of regional event. Instead, strong thunderstorms drove the surface circulation toward the east within a localized cell that persisted throughout most of the water-quality survey conducted on January 31, 2007.

At daily and shorter time scales, winds, tides, and waves also mix and transport ambient seawater throughout the water column. Although tidal currents are able mix ocean waters, they are not responsible for significant net transport. The semidiurnal tidal oscillations enter through the eastern end of the Channel and propagate toward the west, driving currents of approximately 0.2 knots (0.1 m/sec). Similarly, internal and surface gravity waves mix coastal seawater in both the horizontal and vertical directions, but do not account for significant net transport until they shoal upon approaching the shoreline.

Figure 4.4-4
Schematic Diagrams of Six Synoptic Circulation Patterns in the Santa Barbara Channel

Notes: (a) Upwelling, (b) Relaxation, (c) Cyclonic, (d) Propagating Cyclones, (e) Flood East, and (f) Flood West.
Source: Harms and Winant 1998.

Subsurface Flow

In contrast to the surface flow field described above, subsurface currents are more important in determining the fate of contaminants suspended in the water column, such as re-suspended sediments and their associated contaminants. To a very limited degree, subsurface currents also influence the fate of oil released at or near the seafloor, but only during its transit to the sea surface. Subsurface currents also influence the trajectory of oil mixed downward into the water column by surface gravity waves, particularly near the shoreline.

The orientation of subsurface currents differs from that of surface currents within the Santa Barbara Channel. Long-term vertical profiles of currents in the Santa Barbara Channel recorded at NDBC53 (Figure 4.4-1) show that average monthly current profiles are often strongly sheared, and rotate in a counterclockwise direction with increasing depth. Nevertheless, near Platform Holly, subsurface flow remains strongly toward the west, even when surface currents weaken, and possibly reverse during the spring. In the deep portions of the north-central Channel, average flow speed increases with depth throughout much of the year, except during late fall, when westward surface flows intensify and become comparable to the subsurface speeds.

Waves

In deep water, surface gravity waves do not account for significant net transport, although they produce loads, stresses, and fatigue on bottom-founded, steel-jacket structures such as Platform Holly. However, when ocean waves approach the shoreline at an oblique angle, they generate along-shore currents within the surf zone. They also create strong oscillatory flows within a benthic boundary layer that can re-suspend surficial seafloor sediments, along with any contaminants entrained within them. Farther offshore, high-wave conditions affect the efficacy of most spill containment and cleanup apparatus, including floating booms and skimmers.

The surface wave climate within the Santa Barbara Channel is a mixture of remotely generated ocean swell, and seas that are produced by local winds. The Channel is comparatively sheltered from swell generated outside the Channel by the Channel Islands to the south, as well as Point Conception and Point Arguello to the north. Additionally, the limited fetch within the Channel impedes local generation of seas with significant wave height. As a result, wave heights are low in the Channel, generally ranging from three feet (ft) to six feet (one m to two m) throughout most of the year. Thus, the prevailing sea state is unlikely to severely restrict oil-spill cleanup activities within the Channel, except in certain regions where a wave window could allow swell to enter the Channel, none of which are near Platform Holly.

Two primary meteorological sources generate significant swell energy that can enter the Channel: winter storms that impinge on the California coastline from the northwest and storm swell generated in the southern hemisphere during summer. Figure 4.4-5 shows wave-height distributions that result from two typical major swell events. One event results from a major winter Pacific Storm that generates swell in the north that propagates into the Channel from the west, as shown in Figure 4.4-5(a). A tropical depression off the coast of Mexico generated the southerly swell event shown in Figure 4.4-5(b).

Figure 4.4-5(a) shows that, during winter storms, most locations along the northern coastline of the Santa Barbara Channel experience wave heights that are less than half as large as those that travel down the middle of the Channel. Certain coastal features, however, can locally amplify wave heights along this section of the coast, particularly near Ventura and at Rincon Point. The zone of focused wave energy near Ventura is caused by the massive sub-aerial fan of sediment deposited on the shelf by the Ventura and Santa Clara Rivers. This large-scale bathymetric feature extends nearly 25 miles (40 km) offshore and concentrates much of the wave energy propagating eastward down the axis of the Channel onto a narrow stretch of coastline near the Santa Clara River mouth. Both of these focusing zones begin to influence wave height well offshore of the coastal feature (O'Reilly et al. 1999). In contrast, the area around Platform Holly, and along the coastal shelf to the west towards LFC where the alternative offshore pipeline corridor lies, is sheltered from major storm-generated westerly swells by Point Conception.

Figure 4.4-5
Swell-Height Predictions In the Santa Barbara Channel during Large Events

Notes: Swell height propagating (a) from the west during winter and (b) from the south during summer.
1 ft = 0.3 m
Source: Adapted from: http://cdip.ucsd.edu/cgi-bin/csh_model_request and accessed during August 2005.

Figure 4.4-5(b) shows that swells generated during summer storms in the south are almost entirely obstructed by the Channel Islands. The locations of the narrow wave windows along the northern coast of the Santa Barbara Channel are extremely sensitive to the direction of the arriving swell, as shown by the fingers of light blue extending northward from the wave windows between Anacapa, Santa Cruz, and Santa Rosa Islands. The Figure also shows that Platform Holly and the shelf to the west are entirely within the wave shadow produced by Santa Cruz Island.

Major swell events aside, waves generally impinge on the mainland shore of the Santa Barbara Channel at a slightly oblique angle, usually with a westerly component. This drives a long-shore current toward the east in the littoral (surf) zone (Emery 1960, cited in Hickey 1993). Thus, the net transport of particulates suspended in the water column near the shoreline is toward the east, in opposition to the westward transport observed farther offshore. The beaches consist of fine- to medium-grained sands backed by high bluffs. About 75 percent of the sand transported to the east by the alongshore drift is discharged from rivers and streams, while the remainder is from cliff erosion. The net transport rate of sediment is approximately 8.1 million cubic feet (ft^3 [(230,000 m^3]) per year (Chambers Group 1992).

Marine Water Quality

A number of factors, including oceanographic processes, contaminant discharge, erosion, natural seafloor seep discharge, and freshwater inflow affect the quality of marine waters in the study area. Petroleum development activities, commercial and recreational vessels, natural hydrocarbon seeps, river runoff, municipal wastewater outfalls, and minor industrial outfalls all contribute to increased nutrients, trace metals, synthetic organic contaminants, and pathogens in offshore waters and sediments.

Seawater Properties

Marine water quality is traditionally evaluated using five seawater properties: temperature, salinity, turbidity, pH, and dissolved oxygen. Site-specific data on these seawater properties were collected as part of the offshore survey conducted in conjunction with this EIR (Refer to Appendix F of the Ellwood EIR Offshore Survey). Representative distributions of these seawater properties were collected along a cross-shore transect that extended along the existing pipeline corridor between Platform Holly and the shoreline near the EOF. The locations of these vertical profiles are indicated by the dark blue squares in Figure 4.4-6. Also on January 31, 2007, a closely spaced along-shore transect of water-quality data was collected within the offshore EMT (red diamond symbols), and several vertical profiles of water-quality data were collected directly over a seep discharge in the southern portion of the EMT region. In addition, water-quality data were collected on a regular basis throughout the five-day swath bathymetry survey to establish sound velocity profiles (**X** symbols). Sound velocity profiles were used to correct acoustic ray paths of sonar pings acquired in the bathymetry survey.

Figure 4.4-6
Location of Water-Quality Stations in the Ellwood EIR Offshore Survey

Figures 4.4-7 and 4.4-8 show vertical sections of six seawater properties measured on January 31, 2007. The transect which was used for the survey was located along the existing pipeline corridor between Platform Holly and the EOF. The sections exhibit a cross-shore water-quality distribution consistent with weak upwelling processes that prevailed in a localized region along the cross-shore transect. During the survey, eastward winds parallel to the shoreline drove surface waters offshore, as shown in Figure 4.4-2 by the southeastward-directed vectors near the southernmost (offshore) extent of the transect. The prevailing winds moved the surface waters southward and offshore. To replace these near-surface waters, deep, cool, nutrient-rich waters were up-welled near the coast. Near the seafloor, deep seawater from offshore was transported shoreward to replace the surface waters that were moved offshore by the winds.

The deep dense seawater that was transported toward the shoreline was characterized by higher salinity and nutrient concentrations, and lower temperature, transmissivity, dissolved oxygen, and pH. The surface and subsurface countercurrents caused vertical stratification that is apparent in most seawater properties at distances beyond approximately two km from the shoreline (Figures 4.4-7 and 4.4-8). Vertical stratification dictates mixing within the water column (Fischer et al. 1979). Highly stratified waters inhibit the vertical transport of water, nutrients, and contaminants introduced by a seafloor source, such as a breach in a petroleum pipeline, or sediments suspended by seafloor construction activities. The steadily increasing temperature and density with depth, which is apparent in the middle and bottom frames of Figure 4.4-7, reflects the degree of water-column stratification at the time of the survey.

Additionally, other characteristics distinguished that the deep water mass arose from its subsurface offshore origin. Reduced dissolved oxygen concentrations above the seafloor, which are delineated in green in the middle frame of Figure 4.4-8, arose because biotic respiration and decomposition had slowly depleted oxygen levels in the deep water mass during the long period since its last contact with the atmosphere. Biotic respiration and decomposition also produced dissolved CO_2 (carbonic acid), which resulted in the lower pH (more acidic) that is apparent at most stations in the bottom frame of Figure 4.4-8. The higher salinity associated with the deep water mass, which is delineated in red in the top frame of Figure 4.4-7, arose from its origin to the south. Waters to the south are higher in salinity because of the excess evaporation relative to precipitation that occurs in that region. These saline waters were carried northward below the sea surface by the Davidson Undercurrent.

Shoreward of two km, Figures 4.4-7 and 4.4-8 show that the water column was relatively unstratified. Contour lines in this region tend to be vertically oriented, while in the deep offshore region, contours of seawater properties tend to be horizontally oriented. Although some of the vertical uniformity in nearshore properties was due to vertical transport generated by wind-driven upwelling, vertical mixing was also enhanced by seep discharge from the Holoil Seep described in the Petroleum Hydrocarbon section below. The Holoil Seep is a weak natural seafloor seep that was located near water-column Station W43. Station numbers are shown at the top of the vertical sections. The signature of the seep's upward transport at that station is particularly apparent in the dissolved oxygen distribution shown in the middle frame of Figure 4.4-8.

Figure 4.4-7
Cross-Shore Vertical Section of Salinity, Temperature, and Density along the Platform Holly Pipeline Corridor on January 31, 2007

Figure 4.4-8
Cross-Shore Vertical Section of Transmissivity, Dissolved Oxygen, and pH along the Platform Holly Pipeline Corridor on January 31, 2007

Low dissolved oxygen, delineated in red, was transported from the seafloor to the sea surface, where it spread laterally. The pH distribution, shown in the bottom frame of Figure 4.4-8, exhibited a similar signature of upward transport. Closer to the shoreline, the distribution of transmissivity, dissolved oxygen, and pH were somewhat more complex.

Unlike the dissolved oxygen and pH distributions, the transmissivity distribution shown in the top frame of Figure 4.4-8, did not exhibit an isolated seep signature. Instead, transmissivity decreased steadily toward shore. Re-suspension of surficial sediments by shoaling surface gravity waves caused the marked decrease in transmissivity that was observed near the shoreline. Turbidity close to the shoreline and within the surf zone is a function of the size of shoaling surface gravity waves. If the waves impinge at an oblique angle to the shoreline, they generate an alongshore current within the littoral zone that can transport re-suspended sediments into hard-substrate sections of the coastline.

The extent of turbidity impacts from marine construction activities, such as the jetting proposed for installation of the utility line and power line in the surf zone, is dependent on the grain-size distribution of the disturbed sediments. The propensity for re-suspension of surficial sediments is a function of their size distribution, the flow velocity above the seafloor, the vertical shear in the flow, the rugosity of the substrate, and its armoring. Once suspended, the aerial extent of turbidity impacts depends on the lateral flow speed and the settling rate of the suspended particulates, where settling rate is dependent on the size distribution of suspended material. Sediment size distribution also influences sediment contaminant concentrations and the infaunal assemblages that reside within the sediments.

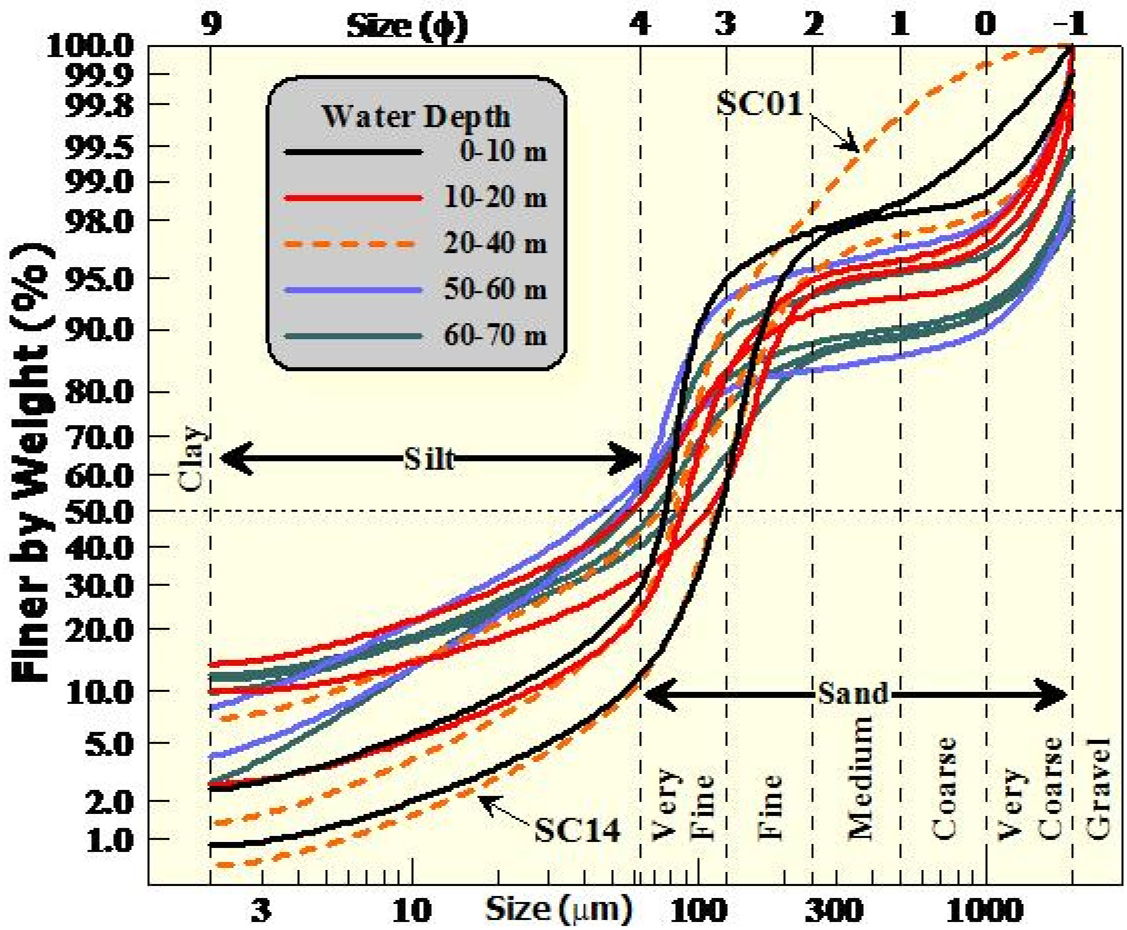
Given the potential importance of the size distribution of surficial sediments in determining turbidity impacts, benthic grab samples of the seafloor were collected as part of the Ellwood EIR Offshore Survey. Surficial sediments that have experienced energetic reworking tend to be better sorted and have a larger median grain-size. For example, sediments near the shoreline, which are subjected to strong oscillatory flow generated by shoaling surface-gravity waves, tend to be larger in diameter and better sorted than sediments offshore. Figure 4.4-9 shows the spatial variability in sediment sorting within the survey area. As expected close to the shoreline, sediment samples collected at Stations SC02 and SC11 were among the best sorted samples collected. These benthic stations were located in water depths less than seven m, where shoaling waves winnowed silts and clays, leaving fine and very fine sands.

Figure 4.4-9
Map of Seafloor Sediment Sorting determined in Benthic Samples Collected during the Ellwood EIR Offshore Survey

Benthic samples collected at two other stations (SC01 and SC14) were also better sorted despite their greater distance from shoreline. Each of these samples was also characterized by an unusually large amount of fine and very fine sand. Both stations were located near natural seafloor seeps, where the energy associated with the seep discharge provided the sorting mechanism. Steichen et al (1996) also found that seep sediments had larger grain sizes than surrounding sediments. Benthic Station SC01 was intentionally located particularly close to the Coal Oil Point seep area east of the pipeline corridor. As a result, its grain-size distribution was somewhat unique among the four moderately sorted samples. It had a greater amount of coarse sand (orange dashed line in Figure 4.4-10) than all the other stations, including the two nearshore Stations (SC02 and SC11, shown by black solid lines).

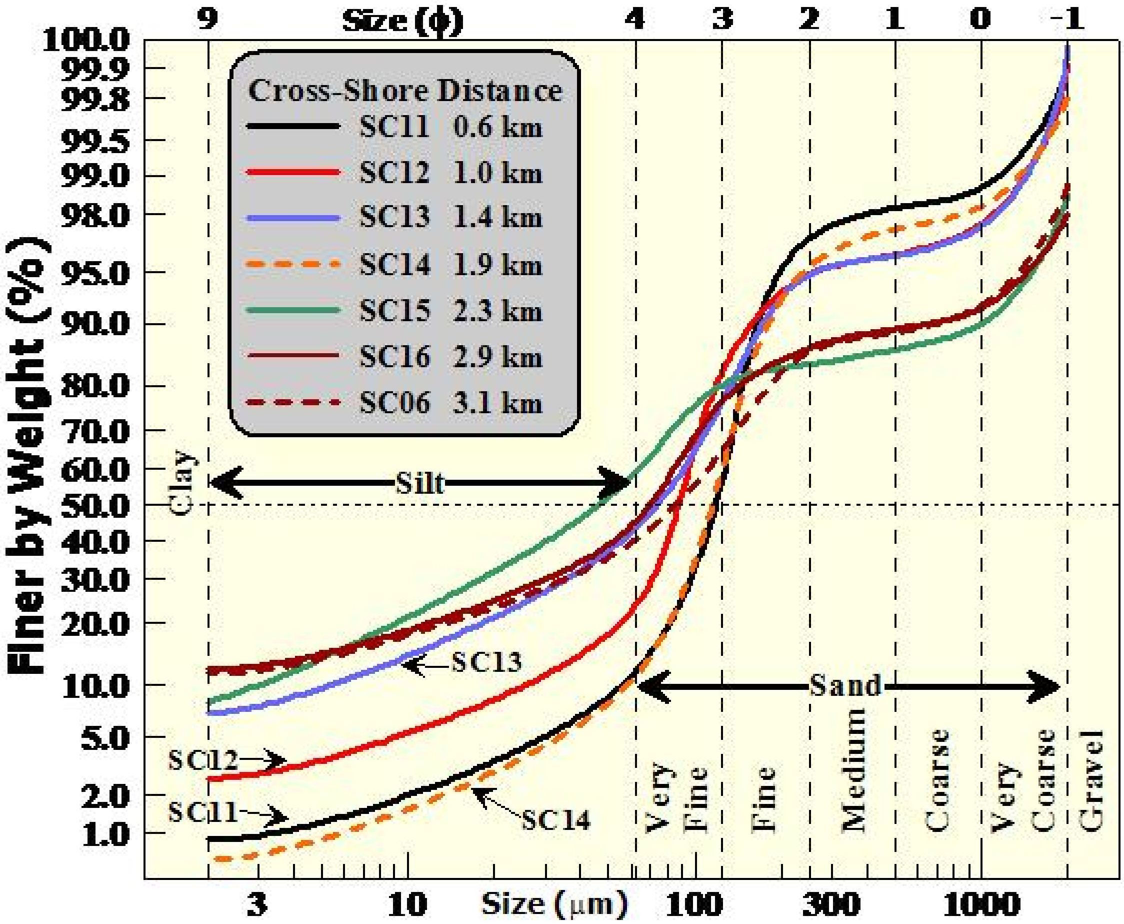
Benthic Station SC14 was collected somewhat farther from the active seep areas, and the medium and coarse fractions of its moderately sorted sediments were more comparable to that of the nearshore sediments. This is evident in Figure 4.4-11, which shows the cross-shore trend in grain-size distributions along the pipeline corridor from Platform Holly to the EOF. The sand fractions on the right side of the figure split into two groups, with sand fractions approximately 15 percent less at the deep offshore stations (SC15, SC16, and SC06). In contrast, the silt and clay fractions on the left of the figure exhibit a distinct cross-shore trend among the stations closest to shore.

Figure 4.4-10
Grain-Size Distributions Categorized By Water Depth In the Benthic Samples Collected during the Ellwood EIR Offshore Survey



Clay-sized particles constituted less than one percent of the sample collected at the shallowest station (SC11), but increased to three percent at the next deepest station (SC12). The sample collected at Station SC13 had a clay fraction (eight percent) comparable to the deepest stations, while its sand fraction remained comparable to the shallower stations. In contrast, the grain-size distribution at Station SC14 was out-of-step with the cross-shore trend. It had the lowest clay fraction of all the samples, suggesting that processes other than wave re-suspension and transport had reworked its sediments. The infaunal community within the sediment sample collected at SC14 was similar to the seep Station SC01, indicating that the mechanics of seep discharge were responsible for winnowing clay and silt from the sediments at that location.

Figure 4.4-11
Grain-Size Distributions In the Benthic Samples Collected Along the Pipeline Corridor between Platform Holly and the EOF during the Ellwood EIR Offshore Survey



Because there are few seeps located along the alternative pipeline route, grain-size distributions within samples collected along that route were dictated exclusively by water depth and distance from shore. Stations located offshore of LFC (SC02, SC03, and SC04 in Figure 4.4-9) cross the inner continental shelf, and exhibit a steady decrease in grain-size sorting. The shallowest sample was collected at Station SC02, only 1706 feet (520 m) from the shoreline in a water depth of 17.7 feet (5.4 m). Accordingly, it had moderately sorted very fine sediments comparable to Station SC11 (two black lines in Figure 4.4-10). Station SC03 was located farther offshore (2.56 km) in greater water depth (56.8 m), where sediments were more poorly sorted with increased fine fractions and reduced sand fractions. The remaining samples (SC04, SC05, SC06, and SC16) were all collected in water depths comparable to Platform Holly, where sediments were very poorly sorted with high silt fractions. Along-shore variability in the sediment size distribution among these stations near the platform depth was small compared to the cross-shore variability.

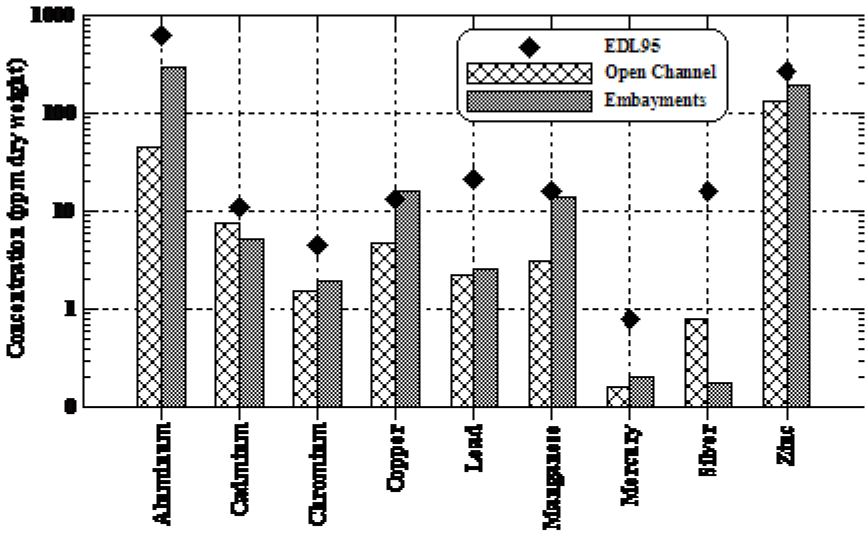
Trace Metals

Ambient trace metal concentrations in the water column were generally below the detection limit of standard analytical methods. Because these and other contaminants are difficult or impossible to measure directly in seawater, resident California mussels (*Mytilus californianus*) have been used as sentinel organisms to indirectly monitor water quality. Like most filter feeders, mussels are capable of concentrating contaminants by factors of 10^2 to 10^5 in their tissues. The mussels accumulate contaminants directly from seawater and from ingested food. They also provide a time-integrated measure of the concentration of bio-available contaminants in the water column.

Average trace-metal concentrations in coastal waters of the Santa Barbara Channel are generally lower than in the embayments and harbors that feed into the Channel, and they are lower than the elevated concentrations found in some of the more contaminated locations along the California coast. This is evident from the trace metal data from the State Mussel Watch Program that are summarized in Figure 4.4-12 (SWRCB 2000). The bar graph shows average concentrations from 26 samples collected at various sites along the open Santa Barbara Channel, including sites on the Channel Islands. The other bar displays the average concentrations from the 26 samples collected at sites within embayments and harbors, such as Santa Barbara and Ventura Harbors, where embayment concentrations are higher for all but two metals.

The higher embayment concentrations are expected because dispersion is more limited in the embayments and some of the harbors have haul-out facilities, where vessels are regularly cleaned, painted, and repaired. For comparison, the 95 percent Elevated Data Level (EDL) is also shown for each metal. It reflects the concentration above which five percent of the 400 samples collected state-wide were distributed. Average concentrations along the open coastline of the Santa Barbara Channel were well below the top five percent of samples collected state-wide. Thus, the concentrations of these nine trace metals were frequently higher in bivalves found in other more-contaminated California coastal regions, especially those collected near more urbanized areas.

Figure 4.4-12
Average Trace-Metal Concentrations in Mussels Collected along the Open Coast and within Embayments of the Santa Barbara Channel Compared to State-Wide Levels



Note: 1 ppm = 1 mg/kg

Waterborne Bacteria and Microorganisms

Bacteria levels in the Santa Barbara Channel vary widely and often increase after significant rainfall. This increase is due to the runoff of contaminants accumulated onshore during long dry periods. Episodic storms, which typically occur from late fall through early spring, contribute more than 95 percent of the annual runoff volume and pollutant loading within the southern California coastal waters (Schiff et al 2000). Standard techniques report the most probable number (MPN) of coliform organisms per ounce (oz) (per 100 milliliters [ml]) of water sample (MPN/oz [MPN per 100 ml]) and have detection limits near 0.6 MPN/oz (2 MPN per 100 ml). The California Ocean Plan's bacterial limits for water contact areas are 294 total coliform organisms per oz (1,000 total coliform organisms per 100 ml) and 59 MPN/oz (200 MPN per 100 ml) for fecal coliform. While coliform densities in the water column are typically near the detection limit, surf zone samples adjacent to creeks and rivers often exceed bacterial standards during periods of high runoff (MRS 2004).

Because the coastline adjacent to the Project area does not have major creeks that contribute significant amounts of runoff to coastal waters, the beaches near Coal Oil Point have consistently fewer exceedances of bacterial standards than other beaches along the mainland coast of the Santa Barbara Channel. According to records kept by the Santa Barbara County Environmental Health Services over the last decade, shoreline samples at Sands Beach at Coal Oil Point have had an average of six exceedances per year as compared to 32 annual exceedances at East Beach near the outflow of Mission Creek in Santa Barbara.

Compared to stormwater runoff, bacterial contamination in treated effluent discharged from wastewater point sources in the region is low and has little tangible effect on marine water quality. The cities of Goleta, Santa Barbara, Montecito, Summerland, Carpinteria, and Oxnard all discharge treated sewage into the Channel, totaling approximately 36 million gallons per day (MGD) (136,275 m^3 per day). These effluents contain approximately 20 parts per million (ppm) (20 milligrams per liter [mg/L]) of suspended solids and 60 ppm (60 mg/L) of biochemical oxygen demanding material. However, part of the treatment process includes disinfection so bacterial densities are generally negligible.

Stormwater runoff also carries high nutrient loads, which can promote rapid phytoplankton growth and possibly increase the incidence of harmful algal blooms. Phytoplankton productivity is normally limited by the availability of the micronutrient nitrates, phosphates, and silicates in the upper water column. Upwelling is an important mechanism for adding nutrients to the euphotic zone, where primary production takes place. Nutrients are also added to coastal waters by wave-induced re-suspension of organic material contained within seafloor sediments. Onshore runoff and sewage discharge can also introduce unhealthy amounts of nitrogen, which is usually the limiting nutrient for primary production.

Petroleum Hydrocarbons

Petroleum hydrocarbons are an organic contaminant that can be of anthropogenic or natural origin. The principal sources of petroleum hydrocarbons in the Santa Barbara Channel include: urban runoff; produced water discharges; atmospheric deposition from the combustion of fossil fuels; vessel leaks, spills, exhaust; the leaching of creosote from wooden pilings; oil and grease contained in municipal sewage effluent; and natural oil seeps.

Generally, marine oil spills do not severely degrade open-ocean water quality except during, and for a few weeks after, the spill. Most of the components of crude oil are insoluble in seawater and, because the spill floats on the sea surface, impacts to the water column are limited. Also, aromatic hydrocarbons, such as benzene and toluene, which are considered to be the most toxic hydrocarbons to marine life, evaporate quickly as the spill weathers in the marine environment. Other weathering processes, such as spreading, dissolution, dispersion, emulsification, photochemical oxidation, and microbial degradation, decrease the volume of the oil slick and increase the viscosity and specific gravity of the spilled oil. Thus, mortality of marine organisms arising from the physical effects of smothering and coating is of greatest concern from weathered oil. However, toxicological effects from exposure to aromatic hydrocarbons can be significant if unweathered oil reaches the shoreline, particularly in areas with rocky shorelines, enclosed embayments, estuaries, and wetlands. As discussed in Section 4.5, Biological Resources, the coastline of the Santa Barbara Channel includes many of these sensitive coastal habitats.

The coasts of Santa Barbara and Ventura counties also encompass one of the most prolific hydrocarbon seep areas in the world (Hovland and Judd. 1992). Section 4.1, Geological Resources, provides some background on natural seeps in the Coal Oil Point area. As described in that section, the most intense areas of seepage are distributed along the axes of three major faulted anticlines (Figure 4.4-13). It also describes how the non-methane hydrocarbon emissions from the Coal Oil Point seeps constitute a large source of air pollution in Santa Barbara county, representing approximately twice the emission rate from all the on-road vehicle traffic in the county (Hornafius et al 1999).

Consequently, the hydrocarbons released by the Coal Oil Point seeps also affect marine sediment quality and seawater quality in the area. The Holoil and Sea Dog Seeps are located near the existing pipeline route between Platform Holly and the EOF. As described above, discharge from the Holoil Seep affected the water quality profiles near Station W43. Furthermore, the Holoil Seep, Sea Dog Seep, or both, may have caused the anomalous seafloor sediment properties and resident infauna at benthic Station SC14 that was described previously. In addition, one well-studied seep, the Shane Seep, is located close to the offshore EMT mooring area, where it influences seawater properties in a variety of ways.

Fisher (1978) found that as few as 2,000 and as much as 30,000 metric tons (240,000 bbl) of oil enter the Santa Barbara Channel each year from natural seeps. Seeps emit both liquid and gaseous hydrocarbon phases, although the Coal Oil Point seeps are predominantly gas discharges. Gases emitted by the most active gas seeps form visible boils upon reaching the sea surface. The surface boil associated with the Shane Seep near the offshore EMT is shown in a photograph taken on January 25, 2007, during the Ellwood EIR Offshore Survey (Figure 4.4-14). There is evidence that Shane Seep has been active since 1960, and is the most intensively studied seep in the area. Many aspects of Shane Seep are regularly monitored because of its proximity to research facilities at the UCSB, and because it is in shallow water, 72 feet (22 m), where Self-Contained Underwater Breathing Apparatus (SCUBA) divers can easily make observations and collect measurements.

Figure 4.4-13
Map of the Seep Field near Coal Oil Point

Source: The seepage distribution is from Quigley et al (1999) based on data from August 1996. The informal seep names and the Holoil, Sea Dog, and Shane Seep locations are from Leifer et al. (2004) and http://www.bubbleology.com/seeps/SeepMapFrame.html accessed September 16, 2007.

Measurements taken at Shane Seep have documented strong upwelling flows of 0.3 m/s that are driven by the rising seep bubbles (Clark et al. 2002). The seep also modifies water quality by saturating the water contained within the bubble plume with methane (Leifer et al. 2000). The transfer of gas to the atmosphere from seeps is potentially a significant source of atmospheric methane, one of the most important greenhouse gases as it is at least twenty times more effective in radiative heating than carbon dioxide.

Figure 4.4-14
Photograph of the Gas Boil at Sea Surface above the Shane Seep

The seafloor expression of Shane Seep is distributed over an area of about 100 m^2 and consists of numerous small vents surrounding two large tar and mud volcanoes. Each volcano had a diameter of about 10 feet (three meters), rising one meter above the seafloor. Leifer et al (2004) observed gas ejection events possibly related to tar blockage at constrictions in sub-bottom fractures with subsequent blowthrough. Regular diver surveys have documented numerous changes in seabed morphology related to the seep, including the appearance of tar mounds and migration of hydrocarbon volcanoes. Dive results have also found that bacterial mats cover most of the seafloor near Shane Seep. However, LaMontagne et al (2004) found that seep hydrocarbons exert a strong selective pressure on bacterial communities in the surrounding sediments, which could control the effects of oil on other biota near marine hydrocarbon seeps. Unlike Shane Seep, Ira Seep, which is located a few hundred meters to the East on the same depth trend, is primarily a tar plain with occasional releases of large diameter bubbles. It is largely devoid of marine life, including bacterial mats.

Total petroleum hydrocarbon (TPH) concentrations within seafloor sediments were measured as part of the Ellwood EIR Offshore Survey (Figure 4.4-15). Although sediment TPH concentrations were high compared to most other open coastal regions offshore southern California, site-specific concentrations bore no apparent relationship to seep proximity. However, because of the patchy distribution of tar deposits surrounding seeps, it is probable that the comparatively low TPH concentration measured at Station SC01, near the Coal Oil Point Seep area, was happenstance. In addition, the relatively high concentrations found at Stations SC02, SC03, and SC05, which are all located more than six miles (10 km) from known seepage areas, indicates seep hydrocarbons are pervasive throughout the region.

Figure 4.4-15
Map of TPH Concentrations Determined In Benthic Samples Collected during the Ellwood EIR Offshore Survey

Although the hydrocarbon concentrations in Figure 4.4-15 appear to be randomly distributed, concentrations in nearshore samples at SC02, SC11, and SC12 were among the highest measured. Moreover, the comparatively elevated levels found in deeper sediment samples from Stations SC03, SC04, and SC13 were not artifacts of the analysis. Statistical assessments of the infaunal communities in the sediment samples demonstrated that the biota at those stations was fundamentally different from that of the other stations (see Appendix F). Moreover, the observed differences in the infaunal assemblages was completely independent (100 percent orthogonal) of the cross-shore variation in infauna. Thus, the unusual character of the infaunal community within these samples was not associated with sediment properties or water depth. Instead, the infaunal communities at these stations were strongly correlated with an increased concentration of hydrocarbons.

Topography and Drainage

Ellwood Onshore Facility

The EOF is located within Bell Canyon, approximately 800 feet from the Pacific Ocean, at an elevation of approximately 20 feet (6 m) above MSL (Figure 4.4-16a). The southeast side of the canyon has been graded to create a level area on which the facilities are located. Bell Canyon Creek is located immediately adjacent to the facility. A pipeline and utility corridor extends south from the EOF to the ocean, along a gently sloping roadway that traverses a low-lying terrace, then down a coastal bluff onto a relatively flat sandy beach.

Proposed Pipeline Route

The proposed pipeline traverses a coastal marine terrace, as well as along the base of adjoining east-west trending coastal foothills, at elevations ranging from 30 feet (9 m) to 250 feet (76 m) above MSL (Figures 4.4-16a through 4.4-16d). The proposed pipeline alignment traverses numerous north-south trending creeks and drainages, including Bell, Tecolote, Eagle, Dos Pueblos, Las Varas, and Gato, as well as Las Llagas, El Capitan and Corral/Las Flores creeks. However, with the exception of localized steep creek banks and limited man-made embankments, such as immediately north of the EOF, where the alignment traverses the highway, the topography along the proposed alignment slopes gently to moderately. Several of the larger canyon crossings, such as Eagle, Tecolote, and El Capitan canyons, are flat-bottomed with locally incised (i.e., vertical to near-vertical) creek banks.

Ellwood Marine Terminal

The EMT is situated on a coastal marine terrace, approximately 500 feet (150 m) northeast of a coastal bluff; approximately 800 feet (244 m) northeast of the Pacific Ocean; approximately 1,000 feet (300 m) northwest of Devereux Slough; and approximately 1,500 feet (450 m) southwest of Devereux Creek (see Figure 4.4-16a). The topography at the site has been partially graded, resulting in relatively flat-lying areas on which the storage tanks, pump house, control room, and related infrastructure are located. However, a southeast-trending gully, approximately 20 feet to 25 feet (six to 7.5 m) deep, is located along the southwest portion of the site. An earthen-fill dam has been constructed across the upper portion of the gully, creating a pond upstream of the dam. The gully trends toward a dune swale pond and surrounding wetland located approximately 400 feet to 500 feet (120 m to 150 m) southeast and topographically downgradient from the EMT and associated marine loading line, at the closest point. The pond and surrounding wetland is an enclosed drainage that is not hydrologically connected, i.e., on the surface, to nearby Devereux Slough, except when water level in the Slough is greater than 5.6 feet (1.7 m) above MSL (URS Corporation 2004). During such periods of higher water levels, a small southeast trending drainage located along the landward side of the coastal dunes connects the two water features, thus substantially increasing the storage capacity of the Slough.

From the EMT, the onshore portion of the marine loading line trends southwest across the southeast-trending gully and southeast-sloping coastal marine terrace; across active coastal sand dunes blanketing the approximate 20-foot (six m) high coastal bluff; and across a relatively flat beach area. With the exception of the gully, surface runoff occurs as sheetflow within the EMT and across the coastal terrace on which the marine loading line is situated. Sheetflow runoff from the EMT generally flows northeast and southeast toward Devereux Creek and Devereux Slough, whereas runoff from the pipeline corridor occurs as sheetflow and gully flow southeast toward the nearby dune swale pond/wetland area, as well as southwest toward the Pacific Ocean.

Devereux Creek Watershed

Devereux Creek is a mapped blue line creek and designated environmentally sensitive wetland habitat (Santa Barbara County 2000). The creek flows only intermittently with its mapped source located in the area now known as Winchester Commons, located approximately 0.5 mile (0.8 km) east-northeast of the EOF and proposed pipeline and 1.5 miles (2.4 km) northwest of the EMT. The Devereux Creek watershed is approximately 2,369 acres (959 hectares [ha]) and is bounded by the foothills of the Santa Ynez Mountains to the north, Storke Road and Isla Vista to the east, the Pacific Ocean to the south, and Ellwood Canyon to the west. The watershed includes two north-south trending, unnamed feeder creeks, which flow into Devereux Creek on the Ellwood Mesa, north-south trending Phelps Ditch/El Encanto Creek, and other man-made drainage channels (Figure 4.4-16a). Watershed elevations range from sea level

Figure 4.4-16a
Topography and Drainage along Pipeline Route

1 Source: USGS 7.5-Minute Dos Pueblos Canyon and Goleta, California, 1988

Figure 4.4-16b
Topography and Drainage along the Pipeline Route

Source: USGS 7.5- Minute Dos Pueblos Canyon and Goleta, California, 1988

Figure 4.4-16c
Topography and Drainage along the Pipeline Route

Source: USGS 7.5 Minute Tajiguas, California, 1982; Dos Pueblos Canyon, California, 1988

Figure 4.4-16d
Topography and Drainage along the Pipeline Route

Source: USGS 7.5 Minute Tajiguas, California, 1982 to 580 feet (176.8 m) above MSL. Lower areas of the watershed generally are urbanized and the upper reaches consist primarily of native coastal sage scrub and chaparral vegetation, as well as agricultural lands. Approximately 60 percent of the watershed has been developed. Although rainfall averages approximately 15.5 inches (0.39 meters [m]) near Devereux Slough, the basin-wide average is nearly 18 inches (0.46 m). Natural annual runoff was approximately 480 acre-feet (AF [592,071 m^3]) in 1944; however, the volume has increased approximately 44 percent with urban development and now exceeds 690 AF (851,102 m^3) per year (Davis et al. 1990). Although sometimes dry, the Devereux Creek is nevertheless an integral element of the Devereux Slough Ecological System, providing fresh water to the estuarine system.

Since the late 1920s, coastal development and industrialization have led to a significant decline in general ecosystem health. Federal, State, and local policies to drain, fill, or somehow convert wetlands to more “productive” agricultural and urban land uses were the norm, resulting in widespread direct destruction of wetland habitat. Substantial ecological impacts to wetlands continue from historical filling, hydrologic modification, including flood control and water supply projects, pollution from point and non-point sources, and introduction of invasive species (California Coastal Conservancy 2001).

Water quality testing, which was included as part of the Santa Barbara County Water Agency’s Project Clean Water, indicates that the Devereux Slough is polluted by runoff containing bacteria and nutrients that exceed acceptable levels, and are capable of accelerating aquatic plant and algae growth. In particular, 1999 and 2000 stormwater testing indicates that water in Devereux Creek has elevated levels of fecal and total coliform, enterococcus, pesticides (primarily diazinon), and heavy metals such as copper, lead, and zinc. In addition, streams entering Devereux Slough carry a high sediment load. These pollutants and others typical of urban development are apparently contributing to significant degradation of the Devereux Slough sensitive habitat (Santa Barbara County 2001; Almy 2001).

Groundwater

The eastern portion of the Project area, east of Bell Canyon, overlies the West Subbasin of the Goleta Groundwater Basin. This underground reservoir is considered to be hydrologically separate from the North and Central subbasins of the Goleta Groundwater Basin (Goleta North/Central Basin). Based on the most recent analysis, the West Subbasin is in a state of surplus. However, water quality from wells drilled in this subbasin is of poor quality and low yield, but is classified as beneficial use drinking water by the RWQCB under the Basin Plan. Saline, perched groundwater may be present beneath portions of the Project area, at depths equal to or slightly above sea level, as evidenced by a dune swale pond, located southeast of the EMT.

The western portion of the Project area, west of Bell Canyon, does not overlie any designated groundwater basins. Samples collected from numerous groundwater wells in the late 1960s indicated that most of the groundwater from this area was too hard for domestic use without treatment. In addition, salinity was found at hazardous concentrations in many wells. Seawater intrusion might be occurring in alluvial areas near the coast. However, the presence of impermeable strata (i.e., the Rincon and Monterey shale formations) might prevent seawater from reaching deeper aquifers (Santa Barbara County 2005).

The U.S. Geological Survey estimated the total groundwater in storage above sea level, from Ellwood to Gaviota, to be over two million AF. This study also estimated that average annual recharge (safe yield for consumptive use) to this area is 6,000 AF per year (AFY), on the basis of groundwater discharge measurements. Groundwater comprises the majority of the water supply used in this area, although some Lake Cachuma water was imported into the eastern half of the region in the early 1960s (less than 1,000 AFY), and is still used in support of agriculture to the present time (Santa Barbara County 2005).

Groundwater in the Ellwood-Gaviota area is produced from wells that tap bedrock aquifers or alluvial sediments that have accumulated along canyon floors. Land uses supported by this pumpage include the ExxonMobil LFC oil processing facility, the Chevron Gaviota oil processing facility, residential development, and agriculture at the El Capitan Ranch, the El Capitan and Refugio State Parks, the Tajiguas Municipal Landfill, and several large avocado orchards (Santa Barbara County 2005).

4.4.2 Regulatory Setting

Federal

Clean Water Act (33 U.S.C. ss/1251 et seq.)

The 1972 Federal Water Pollution Control Act and its 1977 amendments, collectively known as the Clean Water Act (Act), established national water-quality goals and the basic structure for regulating discharges of pollutants into the waters of the United States. The Act also created a National Pollutant Discharge Elimination System

(NPDES) of permits that specified minimum standards for the quality of discharged waters. It required states to establish standards specific to water bodies and designated the types of pollutants to be regulated, including total suspended solids and oil. The Act authorized the U.S. EPA to issue the NPDES permits.

Under NPDES, all point sources that discharge directly into waterways are required to obtain a permit regulating their discharge. Each NPDES permit specifies effluent limitations for particular pollutants, as well as monitoring and reporting requirements for the proposed discharge. Permit issuance, receipt of monitoring data submitted by permittees, compliance monitoring, and enforcement are the primary responsibilities of states when the discharge occurs within the three mile (4.8 km) territorial limit.

Oil Pollution Act

The Oil Pollution Act of 1990 established a single uniform Federal system of liability and compensation for damages caused by oil spills in U.S. navigable waters. The Act requires removal of spilled oil and establishes a national system of planning for, and responding to, oil spill incidents. It includes provisions to:

- Improve oil-spill prevention, preparedness, and response capability;
- Establish limitations on liabilities for damages resulting from oil pollution;
- Provide funding for natural resource damage assessments;
- Implement a fund for the payment of compensation for such damages; and
- Establish an oil pollution research and development program.

The Secretary of Interior is responsible for spill prevention, oil-spill contingency plans, oil-spill containment and clean-up equipment, financial responsibility certification, and civil penalties for offshore facilities and associated pipelines in all Federal and State Waters. The U.S. DOT designated the U.S. Coast Guard (USCG) as the lead agency for offshore oil spill response, which includes responsibility for coordination of Federal responses to marine emergencies. The USCG is also responsible for enforcing vessel compliance with the Act.

Marine Plastic Pollution Research and Control Act

Originally enacted as the Act to Prevent Pollution from Ships, it prohibited any discharge of oil from a ship within 12 nm (22 km) of land, unless it did not exceed 15 ppm (15 mg/L) or the ship had oil-water separating equipment. The Act was amended in 1987 to implement Annex V of the International Convention of the Prevention of Pollution from Ships. As such, it prohibits the discharge of plastic, garbage, and floating dunnage within three nm (six km) of land. Beyond three nm (six km), garbage must be ground to less than one inch (0.025 m), but discharge of plastic and floating dunnage is still restricted. This Act requires manned offshore platforms, drilling rigs, and support vessels operating under a Federal oil and gas lease to develop waste management plans and to post placards reflecting discharge limitations and restrictions on plastics and other forms of solid wastes. The USCG enforces these requirements.

Coastal Zone Management Act

In accordance with the Coastal Zone Management Act and the Coastal Zone Reauthorization Amendments of 1990, all Federal activities must be consistent, to the maximum extent practicable, with the enforceable policies of each affected state's coastal zone management program. In each state, the coastal zone management program sets forth objectives, policies, and standards regarding public and private use of land and water resources in the coastal zone.

Marine Protection, Research, and Sanctuary Act

In 1972, this Act established the National Marine Sanctuary Program, which is administered by the NOAA of the Department of Commerce.

There are two Federal marine sanctuaries within the Project study area: the Channel Islands National Marine Sanctuary (CINMS), and the Monterey Bay National Marine Sanctuary (MBNMS). The primary goal of these sanctuaries is the protection of the natural and cultural resources contained within their boundaries.

Designated in 1980, the CINMS surrounds the four northern Channel Islands out to a distance of six nm (11 km). Sanctuary regulations prohibit exploring for, developing, and producing hydrocarbons within the CINMS, except pursuant to leases executed prior to March 30, 1981, and except the laying of pipeline, provided specified oil spill contingency equipment is available at the site of such operations. In 2003, regulations went into effect that restrict fishing and other extractive uses in 10 marine reserves and two conservation areas within the CINMS (CDFG 2001, CINMS 2001, and CDFG 2002).

The MBNMS, created in 1992, is located offshore of California's central coast. Stretching from Marin to Cambria, the MBNMS encompasses a shoreline length of 276 miles (444 km) and 5,322 square miles (13,784 km^2) of ocean, extending an average distance of 30 miles (48 km) from shore. As such, the northern barge transport route passes through portions of the MBNMS en route to San Francisco. Within the boundaries of the sanctuary are the nation's largest kelp forests, one of North America's largest underwater canyons, and the closest-to-shore deep ocean environment in the continental United States. The MBNMS is also home to one of the most diverse marine ecosystems in the world, including 33 species of marine mammals, 94 species of seabirds, 345 species of fishes, and numerous invertebrates and plants.

USCG Regulatory Authority

Primary responsibility for the enforcement of U.S. maritime laws and regulations falls upon the USCG The USCG is responsible for managing and regulating provisions for safe navigation of vessels in U.S. waters, as well as the enforcement of environmental and pollution prevention regulations. As such, the USCG provides for the regulation and enforcement of hazardous working conditions on the outer continental shelf (OCS), for the management and regulations of measures for pollution prevention in territorial waters, and for ensuring the implementation of provisions in the Oil Pollution Act and the Marine Plastic Pollution Research and Control Act. The USCG also enforces the Clean Water Act, including approval of procedures to be followed and the equipment used for the transfer of oil from vessel to vessel and between onshore and offshore facilities and vessels. The USCG also conducts pollution surveillance patrols to detect oil discharges within the territorial sea and contiguous zone and has enforcement authority over violations. The USCG maintains strike team responsibilities should an oil spill occur.

State

California Water Code

Section 13142.5 of the California Water Code provides marine water-quality policies stating that wastewater discharges shall be treated to protect present and future beneficial uses, and, where feasible, to restore past beneficial uses of the receiving waters. The highest priority is given to improving or eliminating discharges that adversely affect wetlands, estuaries, and other biologically sensitive sites; areas important for water contact sports; areas that produce shellfish for human consumption; and ocean areas subject to massive waste discharge.

Porter-Cologne Water Quality Control Act (CWC section 13000 et seq.; CCR Title 23, Chapter 3, Chapter 15)

Since 1973, the California State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCBs) have been delegated the responsibility for administering permitted discharge into the coastal marine waters of California. The Porter-Cologne Water Quality Act provided a comprehensive water-quality management system for the protection of California waters and regulated the discharge of oil into navigable waters by imposing civil penalties and damages for negligent or intentional oil spills. Under the Act "any person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the State" must file a report of the discharge with the appropriate Regional Water Quality Control Board. Pursuant to the Act, the regional board may then prescribe "waste discharge requirements" (WDRs) that add conditions related to control of the discharge. Porter-Cologne defines "waste" broadly, and the term has been applied to a diverse array of materials, including non-point source pollution. When regulating discharges that are included in the Federal Clean Water Act, the State essentially treats WDRs and NPDES as a single permitting vehicle. In April 1991, the SWRCB and other State environmental agencies were incorporated into the California Environmental Protection Agency.

This Act is the primary State regulation addressing water quality and waste discharges on land. Permitted discharges must be in compliance with the regional Basin Plan that was developed by the Central Coast Regional Water Quality Control Board for Region 3, which includes Santa Barbara county and the EMT area. Each Regional Board implements the Basin Plan to ensure that projects consider regional beneficial uses, water quality objectives, and water quality problems.

The Project does not involve any discharges to surface waters and, therefore, does not likely require Section 401 certification. However, the RWQCB regulates urban runoff discharges under the National Pollutant Discharge Elimination System (NPDES) permit regulations. NPDES permitting requirements cover runoff discharged from point, e.g., industrial outfall discharges, and non-point, e.g., stormwater runoff, sources. The

RWQCB implements the NPDES program by issuing construction and industrial discharge permits.

Best Management Practices (BMPs) are required as part of a Storm Water Pollution Prevention Plan (SWPPP). The EPA defines BMPs as “schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the United States. BMPs include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage” (40 CFR 122.2).

California Harbors and Navigation Code

Discharges from vessels within territorial waters are regulated by the California Harbors and Navigation Code. One of its purposes is to prevent vessel discharges from adversely affecting the marine environment. Section 151 regulates oil discharges and imposes civil penalties and liability for cleanup costs, when oil is intentionally or negligently deposited on the waters of the State of California.

California Ocean Plan

The SWRCB prepares and adopts the California Ocean Plan, which incorporates the State water quality standards that apply to all discharges to the ocean (Table 4.4-1), and which is part of the California Coastal Management Program. The standards identified in the California Ocean Plan are consistent with the limitations specified in the NPDES General Permit. This determination was made when the CCC (2001) concurred with the U.S. EPA consistency certification that the proposed activities are consistent with the enforceable policies of the Coastal Management Program. In addition to the narrative standards specified in the Ocean Plan, numerical water quality objectives are specified.

Table 4.4-1
California Ocean Plan Water Quality Standards

A. Bacterial Characteristics

1. Water-Contact Standards

   Within a zone bounded by the shoreline and a distance of 1,000 ft from the shoreline or the 30 ft depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board, but including all kelp beds, the following bacterial objectives shall be maintained throughout the water column:

   a. Standards based on the geometric mean of the five most recent samples from each site: (i) Total coliform density shall not exceed 1,000 per 100 ml; (ii) Fecal coliform density shall not exceed 200 per 100 ml; and (iii) Enterococcus density shall not exceed 35 per 100ml.

   b. Single Sample Maximum: (i) Total coliform density shall not exceed 10,000 per 100 ml; (ii) Fecal coliform density shall not exceed 400 per 100ml; (iii) Enterococcus density shall not exceed 104 per 100 ml; and iv. Total coliform density shall not exceed 1,000 per 100 ml when the fecal coliform/total coliform ratio exceeds 0.1.

      The "Initial Dilution Zone" of wastewater outfalls shall be excluded from designation as "kelp beds" for purposes of bacterial standards, and Regional Boards should recommend extension of such exclusion zone where warranted to the SWRCB (for consideration under Chapter III.H.). Adventitious assemblages of kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp beds for purposes of bacterial standards.

2. Shellfish Harvesting Standards

   At all areas where shellfish may be harvested for human consumption, as determined by the Regional Board, the following bacterial objectives shall be maintained throughout the water column: The median total coliform density shall not exceed 70 per 100 ml, and not more than ten percent of the samples shall exceed 230 per 100 ml.

B. Physical Characteristics

1. Floating particulates and grease and oil shall not be visible
2. The discharge of the waste shall not cause aesthetically undesirable discoloration of the ocean surface.
3. Natural light shall not be significantly reduced at any point outside the initial dilution zone as a result of the discharge of waste.
4. The rate of deposition of inert solids and the characteristics of inert solids in ocean sediments shall not be changed such that benthic communities are degraded.

C. Chemical Characteristics

1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.
2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.
3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.
4. The concentration of substances set forth in Chapter II, Table B, in marine sediments shall not be increased to levels, which would degrade indigenous biota.
5. The concentration of organic materials in marine sediments shall not be increased to levels that would degrade marine life.
6. Nutrient materials shall not cause objectionable aquatic growths or degrade indigenous biota.

D. Biological Characteristics

1. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
2. The natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption shall not be altered.
3. The concentration of organic materials in fish, shellfish or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

E. Radioactivity

1. Discharge of radioactive waste shall not degrade marine life.

Proposed California Toxics Rule

Water quality criteria for priority toxic pollutants for California inland surface waters, enclosed bays, and estuaries were adopted. These federally promulgated criteria, together with State-adopted designated uses, create water quality standards for California inland waters. This rule satisfies Clean Water Act requirements and fills the need for water quality standards for priority toxic pollutants to protect public health and the environment. The SWRSB adopted the "Policy for implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California" in 2000.

California Coastal Act (PRC 30000 et seq.)

The California Coastal Act is the principal planning and regulatory program for the coastal zone of California. It governs a variety of actions and activities that affect the shoreline throughout the State. Specifically, the Act protects coastal access, environmentally sensitive habitats, agricultural lands, fisheries, cultural resources, and scenic qualities of the shoreline. The Act also establishes guidelines for development in the coastal zone and contains provisions for protecting life and property from coastal hazards. It is implemented through Local Coastal Programs that are developed and adopted by county and city jurisdictions, as well as other State agencies that own land in the coastal zone. The Act also addresses surface waters. Specific sections of the Act address flood hazards and disturbances, maintenance of biological productivity in surface waters, and potential impacts from runoff.

Local

Water Quality Control Plan

The SWRCB allocates water rights, adjudicates water right disputes, develops state-wide water protection plans, establishes water quality standards, and guides the nine Regional Water Quality Control Boards located in the major watersheds of the State. The Regional Boards serve as the frontline for State and Federal water pollution control efforts. The proposed Project falls under the jurisdiction of the Central Coast RWQCB, that has established a Water Quality Control Plan (Basin Plan) for the coastal watersheds of San Luis Obispo, Santa Barbara, and Monterey Counties (RWQCB 1994). The plan has been amended several times since it was originally issued. The amendments can be accessed at the following website:

http://www.swrcb.ca.gov/rwqcb3/BasinPlan/Index.htm#BasinPlanAmendment

The standards of the RWQCB incorporate the applicable portions of the Ocean Plan; and are more specific to the beneficial uses of marine waters adjacent to the Project site. These water quality objectives are designed to protect the beneficial uses of ocean waters within specific drainage basins. The EMT Facility lies within Santa Barbara county, while the barge route to Long Beach passes offshore of Los Angeles and Ventura counties. The barge route to San Francisco passes offshore of several additional counties (San Luis Obispo, Monterey, Santa Cruz, San Mateo, and San Francisco counties), as well as through portions of the Monterey Bay National Marine Sanctuary.

Project Clean Water

The Santa Barbara County Water Agency, Project Clean Water has been established to reduce or eliminate discharges of pollution into creeks, rivers, ponds, or ocean waters, through implementation of NPDES permit requirements and applicable regulations. This agency conducts stormwater sampling at select locations, including Devereux Slough, located adjacent to the Project site. The County Water Agency is currently in the process of adopting provisions of the Storm Water Phase II Final Rule, which requires the operator of a regulated small municipal separate storm sewer system (MS4) to obtain NPDES permit coverage, because discharges of stormwater from such systems are considered point sources of potential pollution. MS4s are considered publicly owned or operated point sources because they collect stormwater and direct it to discrete conveyances, including roads with drainage systems and municipal streets.

4.4.3 Significance Criteria

This section describes criteria for evaluating the significance of Project-related activities or incidents that may result in impacts to water resources. In general, the persistence, extent, and amplitude of an impact dictate its significance. Although the thresholds of significance for water-quality impacts are based on quantitative limits promulgated in existing standards, guidelines, and permits, interpretation of unacceptable changes in seawater or sediment conditions often requires some judgment. For example, standards contained in a particular permit may be outdated, or the discharge may be causing previously unrecognized water-quality impacts. In other instances, perceived impacts may be a statistical artifact, such as the toxic sediment guideline for nickel, which exceeds background concentrations in the Santa Barbara Channel (See the Seafloor Habitat subsection in Section 4.5.2, Marine Biological Resources).

Impacts to offshore water quality would be considered significant if:

- Contaminant concentrations within National Marine Sanctuaries, Protected Areas, or Environmentally Sensitive Habitat Areas (ESHA), such as coastal wetlands and kelp beds, measurably increase relative to background concentrations. Potential Project-related changes in seawater properties would be measured against the naturally occurring variability in those properties within the Santa Barbara Channel;
- The water quality objectives contained in the Water Quality Control Plan for the Central Coast are exceeded;
- The water quality objectives in the California Ocean Plan (SWRCB 2005) are exceeded;
- The water quality criteria in the Proposed California Toxics Rule are exceeded;
- Project operations that change background levels of chemical and physical constituents or elevate turbidity producing long-term changes in the receiving environment of the site, area, or region thereby impairing the beneficial uses of the receiving water occur; or
- Contaminant levels in the water column are increased to levels shown to have the potential to cause harm to marine organisms, even if the levels do not exceed formal objectives in the Water Quality Control Plan.

Impacts to onshore water resources would be considered significant if:

- The water quality objectives contained in the Water Quality Control Plan for the Central Coast are exceeded;
- The water quality criteria in the Proposed California Toxics Rule (USEPA 1997) are exceeded; or
- Project operations or discharges that change background levels of chemical and physical constituents or elevate turbidity producing long-term changes in the receiving environment of the site, area, or region, thereby impairing the beneficial uses of the receiving water occur.

4.4.4 Impact Analysis and Mitigation

Section 4.2, Hazards and Hazardous Materials, describes the potential for, and extent of, accidental oil spills that may result from changes at facilities as a result of the proposed Project. The release of hydrocarbons has the potential to adversely affect onshore and offshore water resources at levels that exceed the significance criteria. Independent of the facility changes, elimination of barge transportation and installation of an onshore pipeline results in a net reduction in the potential for accidental spills, particularly to the marine environment.

In addition, the Project's construction activities have the potential to impact water quality and hydrology. These construction activities include installation of the onshore pipeline, decommissioning of the EMT, and the cross-shore installation of the utility and power lines near the EOF. Utilization of horizontal directional drilling (HDD) across the shoreline and installation of a new crude oil pipeline to Platform Holly also involve some residual risk to marine water quality. These water-quality impacts are described below.

Project construction, demolition of the EMT, and remediation of contamination at the EMT would create the potential for incidental spills of petroleum products and other construction waste, which could impact surface water and groundwater quality in numerous creeks, Devereux Slough, and the Pacific Ocean. Surface water and/or groundwater quality could be adversely impacted by drilling mud frac-outs during horizontal directional drilling beneath Bell, Tecolote, Eagle, and Dos Pueblos canyons. Project operations would create the potential for an accidental release of crude oil to the onshore environment, as a result of geologic hazards, corrosion, weathering, fatigue, or beach scour.

Impact WQ-1: Impacts to Marine Water Quality Due to an Oil Spill From Offshore Facilities

Accidental discharge of petroleum hydrocarbons into marine waters would adversely affect marine water quality (Significant, Class I).

Impact Discussion

As described in Section 4.2, Hazards and Hazardous Materials, Project-related changes at Platform Holly and along the emulsion line to the EOF have the potential to increase the frequency and extent of oil spills to the marine environment. Increased drilling would increase the frequency of spills at Platform Holly. The probability of spills resulting from a breach in the emulsion pipeline from the Platform would not increase, but the size of a potential spill would be larger due to increased throughput. The potential for a pipeline rupture at the shoreline crossing is of particular concern because that section of pipeline is often unburied and exposed to the elements.

The proposed Project increases the risk and volume of spills from offshore facilities beyond current baseline conditions. A large spill would exceed several of the threshold criteria for a significant water-quality impact. Namely, it would introduce hydrocarbon contaminants that persist in the environment, extend beyond the Project area, impact the marine ecosystem, and measurably depart from background concentrations. Therefore, impacts to marine water quality from a large crude oil spill would be considered significant.

Spilled oil produces several impacts to marine water quality that are explicitly addressed in the California Ocean Plan (Table 4.4-1). Surface slicks limit equilibrium exchange of gases at the ocean-atmosphere interface. This reduces near-surface oxygen concentrations, particularly with the increased biochemical oxygen demand of crude oil emulsions. As the seawater-oil emulsion mixes into the water column, turbidity would increase, and toxic hydrocarbons would be released into the water column and seafloor sediments. This release would be more acutely toxic than the slow discharge of hydrocarbons from natural seafloor seeps. Weathering can widely disperse tar balls, which may eventually be ingested by pelagic and benthic biota, with adverse effects.

Although a surface slick can disperse within a few hours of a spill in harsh sea states, lingering effects could persist for much longer periods. For example, it took approximately two years for mussel tissue burdens of aromatic hydrocarbons to return to background levels after the Exxon *Valdez* Oil Spill (Boehm et al. 1995). Although this spill was several magnitudes larger than the spill volumes estimated for the proposed Project, monitoring results indicate the potential for long-term effects. Because there is an increased likelihood of a large oil spill as a result of the proposed Project, and because such a spill would result in tangible damage to marine water quality in excess of levels identified in regulatory criteria, accidental discharges of petroleum hydrocarbons into marine waters are considered a significant impact.

The oil-spill trajectory analyses discussed in Section 4.2, Hazards and Hazardous Materials, demonstrate that a large offshore spill could extend far south and enter the Channel Islands National Marine Sanctuary and the sanctuary's associated Marine Protected Areas. However, the highest probability (80 percent) of spill impingement is along the adjacent coastline where environmentally sensitive habitats, such as extensive kelp forests and wetlands, could be greatly impacted (Figure 4.4-6). This includes Devereux Slough and the UCSB Campus Lagoon, both of which are identified as ESHA in the UCSB Long Range Development Plan (UCSB 1990). Based on typical meteorological conditions, trajectory models predict westward transport and direct impingement on Naples Reef, only 2.3 miles (3.8 km) west of the pipeline corridor (Figure 4.4-6). This unique, high-relief, rocky reef provides habitat for a diverse assemblage of marine organisms that would be impacted by deleterious changes in seawater quality resulting from a spill.

Mitigation Measures

Implement **MM HM-3a, HM-3b,** and **HM-3c** identified in Section 4.2, Hazards and Hazardous Materials. Implement **MM WQ-3a** where pipelines crossing the surf zone and beach are installed by horizontal directional drilling.

Rationale for Mitigation

Implementation of these mitigation measures would reduce the probability and volume of an oil spill, and its subsequent impacts to marine water quality. The use of down-hole pumps would help reduce spill volumes in the event of an equipment failure or blowout on Platform Holly (**MM HM-3a**). Replacement of the entire emulsion pipeline when significant deterioration is identified, rather than in sections, would reduce the chance of a subsequent pipeline rupture (**MM HM-3c**). Replacing the section of the exposed emulsion pipeline on the beach with a pipeline bored under the beach would also reduce the risk of a pipeline rupture within the sensitive intertidal zone (HM-3b). The horizontal directional drilling (HDD) that would be required to install the pipeline beneath the beach could be conducted in conjunction with the HDD recommended for installation of the utility and power lines (**MM WQ-3a**).

Residual Impacts

Marine water quality impacts associated with accidental oil spills are categorized as significant (Class I) because the proposed mitigation measures would not be completely effective in reducing the significant risk of a spill, nor would they adequately eliminate the significant effect of a spill on marine resources. A large spill of more than a few barrels would violate many of the water quality standards and have a deleterious effect on the marine environment and biota. A spill would generate visible surface sheens, significantly reduce the penetration of natural light, reduce dissolved oxygen, degrade indigenous biota, and result in hydrocarbon contamination within the water column and marine sediments. The duration and area of the impact would be largely dictated by the size and location of the spill, and the various physical conditions of the sea at the time of the spill. Impacts would last from days to weeks and extend for tens of kilometers.

Mitigation of water quality impacts from a major marine oil spill is largely a function of the efficacy of the spill response measures. The effectiveness of spill cleanup measures is dependent on the response time, availability and type of equipment, size of the spill, as well as the weather and sea state during the spill. Only some of these aspects are within the control of the spill response team. In addition, many oil spill response measures, such as dispersants, have impacts of their own. Because there are limitations to thorough containment and cleanup of an offshore oil spill, significant impacts (Class I) to water quality remain.

Although the technology has improved in recent years, complete containment and cleanup of an oil spill at sea is nearly impossible. The effectiveness of offshore containment and cleanup equipment and procedures is largely dependent on the type of oil, volume of the spill, sea state (swells, wind waves, chop, etc.), and proper use of the equipment. Shoreline contamination is probable with any major spill, but particularly because the location of the spill is likely to occur within only 1.8 miles (three km) of the adjacent coastline. Adverse sea and weather conditions could exceed the capabilities of containment and cleanup equipment and large areas of the coastline could be impacted by the spill. In the case of the Torch pipeline spill that occurred much farther offshore in 1997, shoreline contamination occurred even under optimal weather and sea conditions for offshore containment and cleanup (Santa Barbara County 2001).

With respect to wind-wave conditions, the containment effectiveness of booms begins to lessen at a significant wave height of two feet (0.6 m). Above two feet (0.6 m), booms and skimmers are ineffective; and in that sea state, a slick would be dispersed and mixed into the water column. For long-period swell conditions, booms and skimmers can retain effectiveness in wave heights greater than two feet (0.6 m). High winds can cause some types of booms to lie over, allowing oil to splash and flow over the boom. High winds can also affect the deployment or shape of the deployment and, thus, the containment effectiveness of the boom.

Under the regulatory-based significance criteria described in Section 4.4.3, even small oil spills could be considered potentially significant. Many regulations and guidelines establish limits based on the presence of a visible sheen on the ocean surface. This criterion is reflected in the static sheen test for free oil identified in the NPDES General Permit, USCG regulations, and the aesthetic criterion C.1 in the Ocean Plan Standards (see Table 4.4-1). Adverse aesthetic impacts from a visible sheen would occur upon discharge of a very small amount of free-phase hydrocarbons into calm marine waters. Because sheens are so thin, as little as 0.5 ounce (28 grams) of oil can form a rainbow sheen covering 500 ft^2 (46 m^2) of calm ocean surface area (Taft et al. 1995).

In addition to the spill-related residual impacts described above, there will be residual water-quality impacts from two of the proposed mitigation measures. Replacement of the emulsion line between Platform Holly and the EOF, when significant deterioration is identified, will result in construction-related effects on water quality. These effects include increases in turbidity during pipe-laying and from vessel anchoring, and introduction of contaminants in the deck wash and bilge water from the construction vessels. However, these water quality impacts will be temporary, are mitigable, and are far less significant than the water-quality impacts from a major spill. As described in WQ-3a, residual impacts to water quality will arise from the HDD of the pipeline under the beach. With the implementation of mitigation measures to reduce drilling-mud loss during frac-outs and daylighting, any water quality impacts from HDD will be temporary in nature, mitigable, and far less significant than the water-quality impacts from an oil spill.

Impact WQ-2: Reduction in Oil Spill Impacts to Marine Water Quality from the Elimination of Barge Transportation

Reduction in the frequency, volume, and spatial extent of offshore oil spills by the elimination of barge loading and transportation would benefit marine water quality (Beneficial, Class IV).

Impact Discussion

Loading and transportation of oil by barge would be eliminated in the proposed Project. As a result, spill impacts would be shifted to the onshore pipeline. The likelihood of marine water-quality impacts from failure of the onshore pipeline is low because the pipeline corridor does not pass close to the shoreline, except at Cañada de la Destiladera at Milepost 6.16, where it lies 100 m from the shoreline (Drawing Number 3895-A-543 in Appendix C). In addition, the largest onshore spill is likely to be comparatively small (237 bbl or 38 m^3).

In contrast, release of the entire barge contents would result in a marine spill of 230 times larger (56,000 bbl or 8,909 m^3). Moreover, a catastrophic spill from the Barge *Jovalan* could occur anywhere along its transport route. A spill in transit to San Francisco could impact the remote and pristine central California coastline within the Monterey Bay Sanctuary. Spill clean-up operations would be delayed due to transit time, and severe sea states that often prevail in the region could make cleanup impossible. The transportation route to the south passes close to, or within the Channel Islands National Marine Sanctuary. Impacts to marine water quality from a barge spill within both of these sanctuaries would be eliminated under the proposed Project. The risk of oil spills or leaks to the marine environment during barge loading operations would also be eliminated under the proposed Project.

Impact WQ-3: Impacts to Marine Water Quality During Utility Line Repair, Power Cable Installation, and Loading Line Removal

Sand jetting the utility and power lines into nearshore seafloor sediments will temporarily increase turbidity and deleteriously impact water quality within sensitive kelp habitats located nearby. Sidecasting of beach sands excavated during loading line removal into the surf zone will unnecessarily increase turbidity within Coal Oil Point kelp beds (Potentially Significant, Class II).

Impact Discussion

Sand jetting will suspend substantial amounts of seafloor sediment in the water column. As a result, sand jetting will increase turbidity and mobilize any contaminants contained within the seafloor sediments into the water column. Based on the Ellwood EIR Survey, sediment contaminants consist largely of naturally occurring hydrocarbons deposited by seep discharges. As shown in Figure 4.4-15, nearshore sediments tend to have higher hydrocarbon concentrations, regardless of their proximity to active seeps. In particular, Station SC11, which is located 1800 feet (550 m) from the shoreline at a depth of 19.7 feet (six m), is located near the offshore limit of the proposed sand-jetting corridor. It had the second highest TPH concentration measured during the EIR survey (644 mg/Kg-dry).

Although these elevated hydrocarbon concentrations within seafloor sediments are related to natural seep discharge, disturbance of those sediments by sand jetting will temporarily introduce elevated hydrocarbon concentrations into the water column. Nevertheless, elevated hydrocarbon concentrations from natural seeps are pervasive throughout the Project area, and the temporary mobilization of acute concentrations within the water column is not likely to impose a significant additional threat to water quality. It is possible that dissolved TPH concentrations resulting from jetting could temporarily exceed maximum limiting concentrations for grease and oil (TPH) specified for effluent discharge in Table A of the California Ocean Plan (75 mg/L), but the same concentrations would be generated by naturally occurring re-suspension from high wave events, such as those occurring during winter storms.

Increased turbidity from sand jetting will also deleteriously affect water quality. Increased turbidity is of concern because kelp forests are sensitive to reductions in the penetration of ambient light, and kelp stands lie within 328 feet (100 m) of the pipeline corridor (Figure 4.4-17). These kelp stands developed on artificial reefs that were left after the demolition of sixteen petroleum piers, which were originally located along this section of the Ellwood coastline. Linear kelp stands that are aligned perpendicular to the coastline match the distribution of hard substrate mapped by swath bathymetry during the Ellwood EIR Survey (Figure 4.4-18). The shapes and locations of these elongated cross-shore hard-substrate features closely correspond to the original piers that existed in the area. The location and configuration of these piers have been documented in NOAA navigational hazard assessments based on archival information such as the photograph of the original pier configurations shown at the upper right of Figure 4.4-16. Portions of the original piers widened to accommodate drilling rigs, and even the shape of these features is accurately reflected by the current kelp beds.

The granular properties of sediments near the pipeline-landing corridor indicate that Project-related increases in marine turbidity could extend into sensitive kelp habitats that boarder the corridor. Fine sand particles with a diameter equal to the median particle size of 115 µm at nearshore station SC11 (Figures 4.4-11 and 4.4-17), will remain suspended in the 49-foot (15-m) water column for about one and a half hours. During that time, a weak 0.1 knots (0.06 m/s) current would carry the suspended particulates into the kelp beds.

Figure 4.4-17
Kelp Distribution near the Pipeline Landfall Determined from Aerial Photographs

Figure 4.4-18
Location of Original Piers and Remaining Seafloor Debris

Despite likely impingement of jetted sands on kelp habitat, the impacts will be of limited duration because the installation is expected to last only two weeks. Moreover, nearshore kelp beds adjacent to sandy beaches are occasionally subjected to naturally high turbidity associated with re-suspension from shoaling surface-gravity waves. Nearshore increases in turbidity were evident during the water-quality survey conducted as part of the Ellwood EIR Offshore Survey. The red shading in the top frame of Figure 4.4-8 shows that there was a sharp decrease in transmissivity within 2300 feet (700 m) of the shoreline during the survey. Because of the naturally increased nearshore turbidity, it is unlikely that temporary re-suspension of sediments during jetting would cause significant reductions in the transmission of natural light that regularly exceed the range of ambient conditions, as defined in the California Ocean Plan Objective B.3 (Table 4.4-1).

The proposed removal of the beach portion of the EMT marine loading line near Coal Oil Point states that "Sand excavated on the sandy beach would be sidecast toward the surf to minimize impacts to benthic organisms." Intentional ejection of sand into the surf zone is unnecessary and does not "minimize impacts to benthic organisms." On the contrary, the resulting increase in surf zone turbidity would adversely affect water quality near the rocky reef area offshore sands beach and the kelp bed near Coal Oil Point.

Mitigation Measures

WQ-3a. Use HDD to install pipelines and cables that cross the surf zone and beach. The Applicant shall employ horizontal directional drilling to install cables and pipelines that cross the sensitive littoral and supratidal zones along the beach. The HDD shall employ available mitigation for limiting frac-outs to the marine environment, including the use of a rhodamine dye tracer in drilling fluid, offshore monitoring for dye release, and the circulation of water to the drill bit prior to daylighting offshore.

WQ-3b. Deploy floating sediment curtains during construction activities that reduce turbidity within the littoral zone. If sand jetting within the littoral zone is required, such as during loading-line removal, and ocean conditions are favorable for curtain deployment, the Applicant shall install a floating sediment curtain downstream of the jetting location to protect nearby kelp beds and rocky reef habitat.

WQ-3c. Do not "sidecast" sand excavated during loading-line removal into the surf zone. Place sand excavated during loading-line removal next to the excavation trench. Upon removal of the loading line, replace the excavated sand into the trench and recontour the beach to its original configuration.

Rationale for Mitigation

For all the reasons described above, the temporary and localized increases in turbidity and hydrocarbon concentrations associated with sand jetting cannot be considered a significant impact to marine water quality. Nonetheless, given the unusual nature of the man-made kelp habitat along this section of the coast, mitigation of potential impacts through the use of HDD is warranted. This is particularly true if an HDD conduit will already be constructed to accommodate replacement of the emulsion pipeline. Placement of the power cable and utility line within the same conduit, or separately drilled conduits, may be cost effective given that the HDD spread will already be mobilized on site. It is important to note that HDD at the nearby EOF is already part of the proposed Project for drilling under Highway 101 to construct the onshore pipeline to LFC.

Nevertheless, HDD in the marine environment poses its own environmental risks. The geologic structure in the Ellwood area is highly fractured; the mere presence of numerous natural hydrocarbon seeps attests to this fact. HDD in fractured geologic structures increases the risk of frac-out, where pressurized drilling fluid used to lubricate the drill bit accidentally migrates into the marine environment through subsea fractures. Although drilling fluid consists largely of bentonite, a non-toxic naturally occurring clay, increased turbidity from a frac-out can defeat the original purpose of the HDD. In sufficient concentration, a suspended bentonite slurry could prove fatal to aquatic organisms if exposure occurs over an extended period. Filter-feeders that reside on hard-substrate surfaces are particularly sensitive because their feeding appendages are susceptible to clogging. However, most of the marine organisms that reside near the shoreline in the area are already exposed to naturally elevated turbidity (See Section 2.3 of the Offshore Survey Report in Appendix F).

In addition, effective mitigation for avoiding frac-outs and for limiting the volume of bentonite released, should a frac-out occur, has been developed for HDD. Extensive experience with cross-shore drilling of fiber-optic cable conduits has demonstrated that monitoring with rhodamine dye in drilling fluid is capable of quickly detecting and limiting releases into the marine environment. In the past, repair of HDD frac-outs has been problematic because traditional methods for sealing fractures in vertical boreholes, such as cement injection, is ineffective for HDD. The injected cement tends to lie in the bottom of the borehole, where it fails to seal the fracture that lies at the top of the borehole. However, experience has again shown that backing the drill bit out of the borehole after cement injection, and drilling beneath the original (partially sealed) borehole is highly effective at eliminating a subsequent frac-out along the same fracture zone.

At some point near the end of the drilling process, the drill bit will penetrate softer offshore sediments overlying the seafloor and some of the re-circulating mud could be introduced into the ocean environment. Assuming the bit daylights in a water depth of 45 feet (15 m), which is the depth of the utility line repair in the proposed project, the discharge would occur 700 feet (213 m) from the nearest kelp stand, in a sedimentary seafloor environment where increased turbidity is of less concern. In addition, the prevailing oceanic flow is along the shoreline, so it is unlikely that significant amounts of undiluted drilling fluid would impinge on the kelp beds. Regardless, HDD-induced turbidity during daylighting can be eliminated entirely by switching to water instead of drill mud, before the drill-bit encounters soft surficial sediments.

Irrespective of potential temporary turbidity impacts associated with HDD, installing all of the cross-shore lines in conduits deep beneath the intertidal zone provides a more stable and permanent means of transiting the sensitive beach and littoral zone. Within a sub-sea conduit, the crude oil pipeline, utility line, and power line would not be directly exposed to breaking wave forces, debris carried by waves, or the fatigue and stress on free spans of pipe.

Impact WQ-4: Impacts to Marine Water Quality during Offshore EMT Decommissioning

Disturbance of hydrocarbon-contaminated sediments near Shane Seep, or other seeps, during decommissioning of the offshore EMT could result in an acute increase in hydrocarbon concentrations within the water column, thereby adversely affecting marine water quality. Hydrocarbons could also be accidentally released from the loading line during decommissioning. Removal of the six mooring anchors will temporarily increase water-column turbidity (Potentially Significant, Class II).

Impact Discussion

EMT decommissioning can result in marine water-quality impacts in three ways. First, the temporary seep tent proposed for collecting errant hydrocarbons accidentally released from the loading line during removal may be ineffective at containing the released oil. Second, removal of the mooring anchors, chains, or other EMT equipment may disturb sediments that contain naturally elevated hydrocarbons. Removal of this seafloor equipment will also increase turbidity near the seafloor.

Seep tents typically have a vertical gap between the seafloor and the base of the tent. Hydrocarbons can be accidentally released from the tent if the tent's capacity is too low, or if strong lateral currents prevail when hydrocarbons are being collected. Turbidity increases generated by the removal of mooring anchors and other seafloor equipment will be localized and temporary.

At least one active seep, Shane Seep, is located in close proximity to the moorings of the offshore EMT (Figure 4.4-19). Other inactive seeps also exist in the area. The seafloor surrounding these seeps is known to contain patchy distributions of elevated hydrocarbons. Disturbance of those seep sediments can prematurely mobilize concentrated hydrocarbons into the water column and deleteriously affect water quality. Disturbance of active vents could increase the discharge rate of gases from the seep, and adversely affect air pollution. Finally, disturbance of the seafloor surrounding the intensely studied Shane Seep will interfere with ongoing scientific monitoring.

Near the shoreline, EMT decommissioning operations should also avoid impacts to rocky reefs that lie inshore of Mooring #4 (Figure 4.4-19a). Sands Seep lies near this rocky reef complex. In addition, kelp stands lie southeast of the mooring close to Coal Oil Point (Figure 4.4-13). Sediments re-suspended during removal of the mooring or the loading line could drift into this sensitive habitat and affect seawater quality there.

Mitigation Measures

WQ-4a. Anchoring Plan If workboat anchoring is necessary during EMT decommissioning, an anchoring plan shall be prepared that specifies exclusion zones surrounding known seeps and hard-substrate areas.

WQ-4b. Differential GPS Navigation Workboats and other vessels involved in the removal of seafloor components of the EMT shall employ differential GPS (DGPS) navigation.

Figure 4.4-19
Swath Bathymetry near the EMT Loading Area Showing
a) the Locations of the Moorings, Shane Seep and Nearshore Reefs, and
b) a 3-D Image of Gas Discharge from Shane Seep

WQ-4c. **Anchoring and Seafloor Lifts** The size and design of any anchors required for removal of EMT seafloor components shall be designed and emplaced to minimize anchor dragging across the seafloor and to avoid unnecessary sediment re-suspension. Seafloor components of the EMT shall be removed by direct vertical lifts, rather than lateral pulls to avoid dragging objects on the seafloor.

WQ-4d. **Seep Research Group Consultation** Prior to decommissioning of the offshore EMT, the Seep Research Group at the University of California at

Santa Barbara shall be consulted as to the location of long-term sampling and monitoring equipment near Shane Seep.

WQ-4e. Optimized Seep Tent Design Loading-line decommissioning shall be conducted during quiescent oceanographic conditions to ensure the effective operation of the seep tents. Hydrocarbon volumes collected in the tents shall be regularly monitored to avoid overfilling, or the capacity of the tents shall be large enough to contain all of the hydrocarbons that could be potentially released from the loading line.

Rationale for Mitigation

Although the EMT decommissioning activities are comparatively brief, and marine water-quality impacts are likely to be limited, measures to reduce adverse effects are warranted. Hydrocarbons within the sediments surrounding seeps are naturally occurring, but disturbance of the sediments could rapidly and prematurely mobilize the hydrocarbons into the water column. Implementation of the mitigation measures will minimize disturbance of these hydrocarbons and their accelerated dispersion into the water column.

Disturbance of seafloor sediments surrounding Shane Seep are of particular concern for the reasons described above. In addition, the seep is located close to Moorings #2 and #3, and could be impacted by decommissioning activities. However, the seep is highly localized, and covers a surface area of approximately 1000 m^2 (Figure 4.4-19). Consequently, impacts to the seep's sediments, and any monitoring equipment surrounding the seep, should be easy to avoid without significantly affecting the decommissioning operations.

In addition to limiting hydrocarbon release from natural seep sediments, implementation of the mitigation measures will also ensure that hydrocarbons within the loading line are not inadvertently released as result of seep-tent failure. Care in removal of seafloor mooring equipment will avoid generating unnecessary water-column turbidity and scarring of the seafloor.

Impact WQ-5: Potential Construction/Demolition Impacts of Nearby Onshore Waterways

Pipeline construction and EMT abandonment could degrade surface and groundwater quality (Potentially Significant, Class II for pipeline construction; No Classification for EMT Abandonment).

Impact Discussion

Pipeline construction and EMT demolition/abandonment activities could result in impairment of water quality in local drainages and the nearby Pacific Ocean. As discussed in Section 4.1, Geological Resources, pipeline construction would potentially result in erosion-induced sedimentation of these adjacent waterways. In addition, potential construction/demolition related contaminants include solid and sanitary wastes, phosphorous, nitrogen, pesticides, oil and grease, concrete washout, construction chemicals, and construction debris. Any of these contaminants would potentially impair surface water runoff.

Similarly, EMT abandonment would include purging of oil from existing piping, tank cleaning, and equipment dismantling and removal. Such activities may result in incidental spills of petroleum products, which could impact the water quality of nearby Devereux Slough, the skim pit wetland and the Pacific Ocean, especially if precipitation occurs simultaneous with abandonment activities. Based on the results of a Phase II environmental site assessment (i.e., subsurface soil sampling and analysis), soil remediation may also be required as part of EMT abandonment. Soil remediation activities (e.g., excavation and off-site disposal of contaminated soil) could result in erosion induced sedimentation of Devereux Slough, as well as incidental spills of petroleum products from excavation and grading equipment. Such contaminants would potentially impair surface water runoff. Therefore, construction related water quality impacts would be potentially significant.

Mitigation Measures

WQ-5a. Implement a Construction-Related Storm Water Pollution Prevention Program. A Project-specific Storm Water Pollution Prevention Plan shall be prepared and submitted to the California Regional Water Quality Control Board, Central Coast Region, to prevent adverse impacts to nearby waterways associated with construction, demolition, and remediation-related erosion and sedimentation, and incidental spills not covered under the existing Oil Spill Contingency Plan or National Pollutant Discharge Elimination System permit. This plan shall include, but not be limited to, a description of Best Management Practices, including erosion and sedimentation prevention measures, spill prevention measures, spill containment equipment, and monitoring requirements to be instituted during any and all construction, demolition, and remediation operations.

Rationale for Mitigation

MM WQ-5a would serve to minimize potential construction, demolition, and remediation-related oil spill-induced water quality impacts to numerous creeks and underlying groundwater resources. **MM WQ-5a** would minimize potential impacts associated with small oil spills by providing site-specific information and management practices regarding on-site drainages and protection of nearby water resources.

Residual Impacts

Information regarding this potential impact is being provided for information purposes only**,** since a complete application for abandonment and reclamation of the EMT site has not been submitted to Santa Barbara County. In accordance with the County of Santa Barbara Land Use and Development Code, Section 35.56, the Applicant would need to obtain a Development and Reclamation permit**,** which addresses the removal of above ground infrastructure, remediation of contamination, and restoration of the site. This permit would require listing the locations of all equipment to be removed and equipment that would remain, both above ground and underground, and the type and extent of all contamination and proposed remedial actions to the level of detail that can be evaluated through environmental review.

Impact WQ-6: Horizontal Directional Drilling Impacts to Nearby Onshore Waterways

Horizontal directional drilling related frac-outs during pipeline construction could degrade surface and groundwater quality (Potentially Significant, Class II).

Impact Discussion

As part of the proposed Project, horizontal directional drilling (HDD) would be completed beneath Bell, Tecolote, Eagle, and Dos Pueblos canyons. Such construction would reduce potential biological impacts in the creek and reduce potential water quality impacts related to erosion and incidental equipment related petroleum spills in the creeks. However, the major concern associated with the HDD method of construction is frac-outs, which is generally defined as an inadvertent return of drilling fluids to the ground surface. Drilling muds typically consist of a mixture of bentonite and water. Bentonite is an inert clay material and is considered essentially nontoxic to aquatic organisms, although it can have adverse physical effects on organisms that become coated. Nevertheless, drilling mud losses could cause temporary and localized increases in turbidity and suspended solids concentrations and promote siltation within the creeks and the underlying shallow alluvial aquifers.

Frac-outs generally occur in very coarse grained, pebbly to cobbly sands, such as locally occurs within the alluvial-filled canyon bottoms and terrace (i.e., older alluvium) deposits, or in fractured bedrock, which locally characterizes the Rincon and Monterey formations in proposed HDD areas. HDD drilling in clay, silt, and fine-grained sand, which is also locally present in alluvial deposits, generally does not result in frac-outs, as these types of sediments allow a cohesive mudpack, or filter-pack, to form on the walls of the borehole. The integrity of the mudpack in these types of sediments prevents the drilling mud from permeating the surrounding strata and migrating to the ground surface or groundwater. The potential for frac-outs also increases with increasing length of the HDD borehole. Longer drilling reaches require increased hydraulic head for effective drilling at increased distances from the drill rig. This increased hydraulic head increases the pressure on the surrounding strata, thus increasing the potential for frac-outs. Due to the proximity of surface water and shallow groundwater to proposed HDD operations, HDD related water quality impacts would be potentially significant (Class II).

Mitigation Measures

WQ-6a. Perform Geotechnical Investigation prior to HDD drilling. A site-specific, geotechnical investigation shall be completed in areas proposed for horizontal directional drilling. Preliminary geotechnical borings shall be drilled to verify that the proposed depth of horizontal directional drilling is appropriate to avoid frac-outs (i.e., the depth of finest grained sediments and least fractures) and to determine appropriate horizontal directional drilling methods (i.e., appropriate drilling mud mixtures for specific types of sediments). The investigation shall include results from at least three borings, the use of casing, a geologic cross section, a discussion of drilling conditions and a history and recommendations to prevent frac-outs.

WQ-6b. Frac-Out Contingency Plan. A frac-out contingency plan shall be completed and include measures for training, monitoring, worst case scenario evaluation, equipment and materials, agency notification and prevention, containment, clean up, and disposal of released drilling muds. Preventative measures would include incorporation of the recommendations of the geotechnical investigation to determine the most appropriate HDD depth and drilling mud mixture. In addition, drilling pressures shall be closely monitored so that they do not exceed those needed to penetrate the formation. Containment shall be accomplished through construction of temporary berms/dikes and use of silt fences, straw bales, absorbent pads, straw wattles, and plastic sheeting. Clean up shall be accomplished with plastic pails, shovels, portable pumps, and vacuum trucks.

Rationale for Mitigation

MM WQ-6a and **MM WQ-6b** would minimize potential HDD related water quality impacts to numerous creeks and underlying groundwater resources. **MM WQ-6a** would minimize potential impacts associated with frac-outs by further defining the geology and thus establishing the most appropriate HDD depth to avoid frac-outs. **MM WQ-6b** would minimize potential impacts associated with frac-outs by establishing a frac-out contingency plan.

Impact WQ-7: Potential Facilities Leaks and Impacts to Nearby Onshore Waterways

A rupture or leak from the EOF, the existing onshore portion of the oil pipeline from Platform Holly to the EOF, or the proposed oil pipeline could substantially degrade surface and groundwater quality (Significant, Class I).

Impact Discussion

Onshore oil and gas processing and transport to LFC could result in spills due to geologic hazards, mechanical failure, structural failure, corrosion, or human error. Such spills could potentially result in water quality impacts to numerous creeks, shallow groundwater, and the Pacific Ocean. Small leaks or spills, which are contained and remediated quickly, may have minor or negligible impacts to onshore water resources. In contrast, large spills, or pipeline or tank ruptures, which spread to surface waters and/or groundwater, may substantially degrade water quality, with potential long-term impacts to beneficial uses and biological resources. Although the potential for oil spills currently exists, the proposed Project increases the potential for onshore leaks or spills, and associated water quality impacts, due to the construction of the proposed oil pipeline across numerous creeks, including Bell, Tecolote, Eagle, Dos Pueblos, Las Varas, Gato, Las Llagas, El Capitan, Corral/Las Flores creeks and several unnamed drainages. Therefore, the impacts associated with the proposed Project are considered significant (Class I).

Any portion of the EOF and pipeline infrastructure has the potential to rupture or leak. Oil spills and associated contaminated stormwater runoff could affect surface and groundwater, depending on the location and size of the spill. Under worst-case conditions, maximum estimated spill volumes of 237 bbl (38 m^3) of oil would be lost from the proposed pipeline, as no secondary containment is present along the pipeline. Although unlined secondary containment is present surrounding the storage tanks at the EOF, the worst case scenario would involve rupture of the oil storage tanks and the adjacent soil containment berms, as a result of severe seismically induced ground shaking. The North Branch More Ranch Fault is located approximately 0.5 mile (0.8 km) southeast of the EOF and proposed pipeline, at the closest point (see Section 4.1, Geological Resources). The EOF was constructed in 1965, and seismic upgrades and retrofitting have not been completed, making the facility more susceptible to earthquake induced damage. Maximum possible spill volumes at the EOF and associated pipelines to Platform Holly and Corral/LFC are presented in Section 4.2, Hazards and Hazardous Materials.

Depending on the location of the containment berm breach, such a spill could flow directly into Bell Creek, located immediately adjacent to the EOF. Similarly, a maximum anticipated pipeline spill could flow into one of the many creeks traversed by the proposed pipeline. Although some of the more toxic components of oil, e.g., volatile organic compounds, would be lost rapidly due to aeration, i.e., volatilization, spills and associated contaminated stormwater runoff reaching any of these waterways could have significant, long-term, and widespread impacts to water quality and consequently, sensitive biological resources. Similarly, subsurface, i.e., underground, spills, or surface spills, could result in significant, long-term contamination of groundwater in alluvial soils, as these soils are generally unconsolidated and permeable with groundwater occurring at relatively shallow depths.

The Applicant currently maintains an Emergency Action Plan (EAP), which addresses spill response actions to be completed in the event of a “significant event.” The EAP provides an emphasis on marine spills; however, the EAP includes brief instructions on spill containment, followed by recommended resources for constructing spill dikes, e.g., one piece of heavy equipment, sand bags, and plastic sheeting. The EAP also contains logistical details, e.g., site access, staging area, and closest boat launch. Implementation of this EAP would reduce potentially significant impacts associated with a larger spill.

The Applicant also maintains the South Ellwood Field Oil Spill Contingency Plan (OSCP). This plan addresses inspection and maintenance, training and drills, notification procedures, and provides general oil spill response and cleanup techniques for various terrains, including for creeks and rivers. The OSCP also includes several appendices containing maps and listings of potentially affected sensitive resources, such as plant and wildlife habitats, creeks and drainages, beaches, sloughs, marshes, etc., in the surrounding area.

The Applicant's EOF Permit conditions #63 and #64, on file with the Santa Barbara County Energy Division, include the following with respect to pipeline inspection in the surf zone:

> *63. The oil emulsion and gas pipelines shall be visually inspected from the surf zone to the EOF on a daily basis for as long as they are in operation. At a minimum, the following information shall be logged for all inspections: time and date of the inspection; inspector's name; burial status of the pipelines; length of pipe exposed, if any; estimated wave height at the surf; any evidence of pipeline movement. Log reports shall be maintained at the EOF and made available to the County for inspection upon request.*

> *64. Venoco shall shut down and displace the emulsion line with seawater during large storms events (defined as waves measuring more than 12 feet in height) when more than 20 feet of the pipeline is exposed. Venoco shall notify P&D of the need to shut down the line immediately upon doing so.*

In addition, a pipeline leak detection system and block valves would be installed for the proposed pipeline from the EOF to the Corral/LFC tie-in. The leak detection system would utilize a pressure and temperature compensated flow-metering system, with meters at each end of the pipeline. In addition, low pressure switches would be installed to monitor for low pressure in the pipeline. The inlet and outlet flow rates would be computed and compared continuously. In the event of a pre-determined deviation between the inlet and outlet flows, or a substantial loss of pressure at either end, the pipeline would be automatically shut down and blocked in.

Such actions, in addition to the Mitigation Measures indicated below, would contribute in limiting the potential for spills and associated significant impacts.

Mitigation Measures

WQ-7a. Implementation of an Operational Storm Water Pollution Prevention Plan. An updated, Project-specific, operations-related SWPPP shall be prepared and submitted to the Central Coast RWQCB before extended lease boundary wells are produced, to prevent adverse impacts to nearby waterways associated with oil spills. The plan will include the onshore portion of the existing pipelines from Platform Holly to the Ellwood Onshore Facility, the Ellwood Onshore Facility, and the proposed pipeline to Corral/LFC. The plan will include preventative and spill contingency measures not covered under the Emergency Action Plan, which only applies to “significant events” and is not discussed in detail by the Oil Spill Contingency Plan. This plan would include, but not be limited to delineation of drainage features and a description of Best Management Practices, including spill containment equipment and procedures that are tailored for the Project site.

WQ-7b. Non-Point Source Water Quality Testing. The SWPPP described in **MM WQ-7a** shall include non-point source runoff water quality goals, established in accordance with the water quality objectives contained in the Water Quality Control Plan for the Central Coast, as well as the water quality criteria in the Proposed California Toxics Rule. Sampling and analysis of non-point source runoff shall be completed downslope of oil spills, subsequent to significant rain events, to demonstrate the completeness of spill containment and remediation. The sampling protocol and analytical results shall be reviewed and approved by the California RWQCB, Central Coast Region.

Rationale for Mitigation

MM WQ-7a and **MM WQ-7b** would minimize potential oil spill-induced water quality impacts to numerous creeks and underlying groundwater resources. **MM WQ-7a and MM WQ-7b** would minimize potential impacts associated with small oil spills by providing site-specific information and management practices regarding on-site drainages and protection of nearby water resources, as well as providing analytical data demonstrating that contaminated stormwater runoff is not entering those nearby water resources.

Residual Impacts

County Energy Division mandated daily nearshore pipeline inspections and high surf contingency plan; augmentation of The Applicant's EAP and OSCP; a pipeline leak detection system; **MM WQ-7a**, implementation of a SWPPP; and **MM WQ-7b,** implementation of non-point source stormwater runoff sampling, would reduce the severity of potential spill impacts to water resources. Regardless, because of the severity of impacts to surface water and groundwater resources associated with potential large oil spills from proposed Project infrastructure, impacts would remain significant (Class I) after mitigation.

Extension of Life Impact

The Applicant has stated that the proposed Project would not increase the life of the existing South Ellwood Field Facilities, which is currently defined by the operational life of Platform Holly until 2040, and would likely reduce the overall duration of oil and gas production from existing facilities due to more efficient extraction of the resource. However, it is possible that increased oil and gas production from new wells drilled into the existing and proposed leases, formations (Lower Sespe) and fault blocks (North Flank and Eagle Canyon) could produce economically viable resources for a longer-than-expected period and increase the life of the existing facilities. Therefore, the impacts identified in Table 4.4-2 have the potential to occur over a longer period than assumed for the proposed project, exacerbating potentially adverse impacts.

Increasing the project duration and exposure of facilities to potential hazards could result in an increased likelihood of an oil spill impacting water resources and would be considered significant (Class I).

Table 4.4-2
Summary of Hydrology, Water Resources, and Water Quality Impacts and Mitigation Measures

Impact	Impact Class	Mitigation Measures
WQ-1: Impacts to Marine Water Quality due to an Oil Spill from Offshore Facilities	Class I	Implement **MM HM-3a, HM-3b, and HM-3c.**
WQ-2: Reduction in Oil Spill Impacts to Marine Water Quality from the Elimination of Barge Transportation	Class IV	None
WQ-3: Impacts to Marine Water Quality during Utility Line Repair, Power Cable Installation, and Loading Line Removal	Class III	**WQ-3a.** Use HDD to install pipelines and cables across the surf zone. **WQ-3b.** Install sediment curtains during construction activities. **WQ-3c.** No sidecasting of excavated sand.
WQ-4: Impacts to Marine Water Quality during Offshore EMT Decommissioning	Class III	**WQ-4a.** Develop an anchoring plan that identifies exclusion zones to allow workboats to avoid seeps and hard substrate areas. **WQ-4b.** Utilize differential GPS (DGPS) to increase accuracy of navigation. **WQ-4c.** Design anchoring and seafloor lifts to minimize seafloor scaring and sediment re-suspension. **WQ-4d.** Consult with the Seep Research Group to avoid damage to seep monitoring equipment. **WQ-4e.** Optimize the seep-tent design and operation to fully capture potential hydrocarbon releases from the loading-line.
WQ-5: Potential Construction/Demolition Impacts of Nearby Onshore Waterways	Not Classified	**WQ-5a.** Implement a construction-related Storm Water Pollution Prevention Plan to minimize runoff and erosion impacts to groundwater and streams.
WQ-6: Potential Horizontal Directional Drilling Impacts of Nearby Onshore Waterways	Class II	**WQ-6a.** Perform a Geotechnical Investigation prior to drilling to verify proper drilling depths and mixtures in order to reduce the potential for frac-outs. **WQ-6b.** Develop and Implement a Contingency Frac-Out Plan.
WQ-7: Potential facilities leaks and impacts to nearby onshore waterways.	Class I	**WQ-7a.** Implement an updated operations-related Storm Water Pollution Prevention Plan to minimize spill impacts to waterways. **WQ-7b.** Conduct non-point source stormwater runoff sampling.

4.4.5 Impacts of Alternatives

No Project Alternative

The No Project Alternative would avoid both the beneficial and adverse impacts identified in the previous section. Impacts are also associated with existing operations, and the incremental increase or decrease in those impacts would not be realized under the No Project Alternative.

Perhaps the most important aspect of the No Project Alternative is that the beneficial impact of reducing marine water-quality impacts during barge transportation (**Impact WQ-2**) would not be realized. The increase in water-quality impacts from a facility spill (**Impact WQ-1**) would be reduced under the No Project Alternative, but a significant potential for a spill would still remain. On the whole, marine water-quality impacts from large oil spills would not be reduced under the No Project Alternative. The proposed Project shifts the likelihood of spills during transportation from offshore to onshore. This is an important consideration because offshore spills are far more difficult to detect, contain, and remediate. Catastrophic spills from the barge during loading or transportation under the No Project Alternative could have widespread impacts on the water quality of remote and pristine sections of the coastline, including regions within marine sanctuaries, where there are low ambient levels of naturally occurring hydrocarbons.

In contrast, a rupture and spill from the onshore pipeline is likely to be limited and would not affect onshore or offshore water quality over as wide of a region. In addition, abandonment of the EMT under the proposed Project would preclude adverse impacts from spills at the EMT, which could affect the underlying groundwater, the nearby dune swale pond, surrounding wetland, Devereux Creek, and Devereux Slough. The potential for these water-quality impacts remain under the No Project Alternative. Minor spills of petroleum products and re-suspension of sediments could occur from equipment during abandonment activities; however, potential short-term water quality impacts associated with such spills would be minimized through implementation of mitigation measures.

Currently, lease agreements for the operations of the EMT are set to expire in 2013 and/or 2016 (see Section 2.0, Project Description). It is assumed that, under the No Project Alternative, after the lease expirations, the Applicant would pursue alternative means of crude oil transport such as pipeline or truck transportation. The impacts of these transportation modes are described in the Venoco Ellwood EMT Lease Renewal Project Draft EIR (CSLC 2007). Any future crude oil transportation options would be subject to appropriate agency review and approval.

No EOF Modifications

This alternative would include all of the components of the proposed Project except there would be no modifications to the EOF. Construction of the proposed pipeline would be the same as described for the proposed Project; however, minor grading and construction related impacts at the EOF would not occur, thus slightly reducing onshore water quality impacts. The EMT would be decommissioned as soon as the pipeline was operational. Under this alternative, impacts to onshore water resources would be slightly less than impacts associated with the proposed Project. Relative to the proposed Project, there would be no substantive change in offshore water quality impacts by implementation of this alternative.

Processing on Platform Holly

Under this scenario, processing equipment would be removed from the EOF and installed on Platform Holly. As a result, the frequency of offshore oil spills would increase slightly over the proposed Project, and as a result, impacts to marine water quality would increase (**Impact WQ-1**). These impacts would remain significant (Class I). Beneficial impacts to marine water quality relative to onshore water quality related to changes in crude transportation would still occur under this alternative (**Impact WQ-2**). Water-quality impacts from pipeline installation and EMT decommissioning would remain similar to the proposed Project. All of the water-quality mitigation measures would still apply.

Impacts to onshore water resources associated with construction of the pipeline and decommissioning of the EMT would be the same as for the proposed Project. Potential impacts to Bell Creek, associated with construction activities within the EOF, would be eliminated; however, excavations and grading associated with removal of oil processing equipment could result in minor erosion induced sedimentation of Bell Creek. Operations within the EOF would be modified from current operation, but this change would not likely affect onshore water resources in the vicinity of the EOF. Therefore, under this alternative, impacts to onshore water resources would generally be the same as for the proposed Project.

LFC Processing: Offshore Gas Pipeline, Onshore Oil Pipeline

Under this scenario, two pipelines would be constructed from Platform Holly to the LFC facility. However, only a gas pipeline would be installed offshore, so marine water quality impacts from a crude oil spill would remain the same as those associated with the proposed Project. Because crude oil transportation, construction, and EMT decommissioning activities would remain similar to the proposed Project, impacts to water quality would also be similar. All of the impacts and mitigation measures identified for hydrology and water quality would continue to apply, including the beneficial impact to marine water quality that results from elimination of barge transportation.

A new gas pipeline would be constructed from Platform Holly to the LFC facility. The onshore component of the gas line would be directionally drilled from a point within the LFC facility to a point offshore; therefore, onshore water resources impacts associated with construction of the gas line would be limited to potential frac-outs during HDD activities beneath Corral/Las Flores Creek and mitigated through **MM WQ3a**. Since this alternative includes construction of the onshore oil pipeline, impacts to onshore water resources associated with that component of this alternative would be the same as for the proposed Project. However, decommissioning of the EOF could result in a potential increase in short-term water quality impacts (similar to Impact **WQ-5**) to Bell Creek, as a result of possible incidental spills during demolition and (possibly) remediation activities. These impacts would be considered Class II and mitigated by **MM WQ5a**. Therefore, onshore water resources impacts for this alternative could be slightly greater than impacts associated with the proposed Project.

LFC Processing: Offshore Gas Pipeline, Offshore Oil Pipeline

Under this alternative, the crude pipeline and power cable from Platform Holly to LFC would be constructed offshore along with the offshore gas pipeline. This would shift water-quality impacts from spills related to crude oil transportation from the onshore environment, as is the case for the proposed Project, to the offshore environment. Consequently, marine water-quality impacts from facility spills and local crude-line transport (**Impact WQ-1**) would be similar to the proposed Project, and the associated mitigation measures would apply. Construction impacts related to the decommissioning of the EMT (**Impact WQ-4**), along with the associated mitigation still apply. Abandonment of the utility line is likely to be necessary so construction impacts to surf zone water quality, described in **Impact WQ-3**, would still occur, and the recommended mitigation would still be a benefit.

Beneficial water-quality impacts associated with the elimination of barge transport under the proposed Project (**Impact WQ-2**) would still occur with installation of an offshore crude line under this alternative. Under the proposed Project and alternatives with an onshore pipeline component, water-quality impacts to the marine environment from a rupture of an onshore pipeline would be minimal compared to an offshore pipeline rupture. Onshore ruptures are far easier to detect and repair than a breach in an offshore pipeline in deep water. More importantly, large spills in the marine environment result in more widespread and more deleterious impacts to water quality. Finally, they are far more difficult to contain and clean up. However, the size of the spill and the frequency of a pipeline compared to a barge would be less, constituting a beneficial impact as per **Impact WQ-2**.

An additional benefit from the water quality standpoint is that the geographic area potentially exposed to a major marine spill would be significantly smaller with pipeline transport. For example, impacts to remote sections of the central California coast, which are possible when the barge transits to San Francisco, would not occur with a spill from an offshore pipeline, where water-quality impacts would be largely restricted to the Santa Barbara Channel.

Since no substantive construction of an onshore pipeline would occur under this alternative, impacts associated with the proposed Project pipeline construction and oil spills to onshore water would be avoided. The onshore component of the new pipelines would be directionally drilled from a point within the LFC facility to a point offshore; therefore, onshore water resources impacts associated with construction of the new pipelines would be limited to potential frac-outs during HDD activities beneath Corral/Las Flores Creek. However, decommissioning of the EOF would result in a potential increase in short-term water quality impacts to Bell Creek, as a result of possible incidental spills during demolition and (possibly) remediation activities. Overall, onshore water resources impacts would be lower than impacts associated with the proposed Project.

4.4.6 Cumulative Projects Impact Analysis

Offshore Water Quality

Two separate components of the proposed Project significantly affect the quality of marine waters of the Santa Barbara Channel, but in opposing ways. Increased drilling at Platform Holly would increase the probability of oil spills, and increased throughput along the crude oil pipeline to shore would increase the potential volume of spills. However, elimination of crude oil transport by barge, in favor of transport via onshore pipeline, would reduce the volume and likelihood of marine oil spills.

Cumulative projects which could produce an increased risk of oil spill that could impact the same coastal areas as the proposed Project include the following:

- LNG Terminal at Platform Grace/Crystal Energy LLC (Project No. 2);
- Carpinteria Field Redevelopment Project/Carone Petroleum Corp. and Pacific Operators Offshore Inc. (Project No. 3);
- Paredon Project/Venoco (Project No. 4);
- Platform Grace Oil Drilling (Project No. 11);
- Development of non-producing Federal leases (Project No. 14); and
- State lease PRC-421 production.

Although the LNG Project (Project No. 2) does not involve oil transportation, the use of large tankers and support vessels introduces the risk of fuel spills into the marine environment because they have dual-fuel engines that use the boil-off LNG and oil fuel. The Carpinteria Field Redevelopment and Paredon Projects would involve increased offshore/near-shore drilling and associated crude oil transportation, which would increase the risks of oil spills into the environment. The Platform Grace Project would not involve movements of crude oil, but would increase vessel traffic and the risks of smaller spills of fuel from accidents. All of these projects would exacerbate an already significant impact associated with the proposed Project's risk of spills and water quality impacts to the offshore environment.

Onshore Water Quality

Numerous other approved and probable future projects may impact the water resources in the Project area. The region of influence for onshore water resources impacts would be limited to those cumulative projects located within the watersheds of Devereux, Bell, Tecolote, Eagle, Dos Pueblos, Las Varas, Gato, Las Llagas, El Capitan, and Corral/Las Flores creeks, which include grading/construction and/or oil processing/transportation. Much of the past, present and foreseeable development activity is concentrated within the Devereux Creek watershed; therefore, the majority of cumulative impacts would occur in that watershed. Known and potential projects in the Devereux creek watershed are listed in Table 4-2 of Section 4.0, Environmental Analysis, and include development of the Rancho Mobile Home Park Subdivision, Citrus Village, the Comstock Homes Development, Sandpiper Golf Course renovations, Devereux School Master Plan, Camino Real Marketplace – skating facilities, Costco Gas Station, and UCSB Sierra Madre Student Housing.

Potential oil spills occurring as a result of the proposed Project could result in contributions to cumulative water quality impacts on Devereux Slough. Stormwater quality testing during 1999/2000 included as part of the Santa Barbara County Water Agency's Project Clean Water indicates that the Devereux Slough is polluted by runoff containing bacteria and nutrients that exceed acceptable levels and are capable of accelerating aquatic plant and algae growth, including elevated levels of fecal and total coliform, enterococcus, pesticides, and heavy metals such as copper, lead, and zinc. In addition, streams entering Devereux Slough carry a high sediment load. Many of the cumulative projects listed above would involve concrete/asphalt paving and/or grading/landscaping, which, in the absence of Best Management Practices, could result in polluted runoff and substantial degradation of Devereux Creek and Devereux Slough.

Other cumulative projects involving grading and construction within watersheds along the proposed pipeline alignment include the ARCO Dos Pueblos Pipeline abandonment and proposed developments at Bacara Resort and Spa, Eagle Canyon Ranch, Santa Barbara Ranch, Las Varas, Edwards Ranch, Tecolote Canyon, Dos Pueblos Ranch, Morehart Land Company, El Capitan Campground, and Dos Pueblos Naples. Potential incidental spills occurring as a result of Project demolition, remediation, grading, and construction could result in contributions to cumulative water quality impacts on both Devereux Slough and other creeks along the pipeline alignment. With the implementation of Best Management Practices; however, the pollutant load contribution of these cumulative projects would result in cumulatively significant impacts, but those impacts could be feasibly mitigated to potentially significant, but mitigable impacts on water quality.

Nevertheless, potential oil spills from a cumulative project that includes a return to production of State lease PRC 421 could result in adverse water quality impacts to Devereux Slough. In addition, potential spills from on-going operations at the ExxonMobil LFC processing facility, POPCO, and the AACP could result in adverse water quality impacts to Corral/Las Flores Creek. Potential oil spills occurring as a result of Project completion could cumulatively contribute to those impacts. Because of the severity of impacts associated with potential large oil spills from the EOF or proposed pipeline, the Project's contribution to the cumulative degradation of Devereux Slough and other creeks along the pipeline alignment would be significant, even with implementation of mitigation measures.

The Santa Barbara County Water Agency is currently developing recommended changes to county land use policies, design standards, and related land ordinances related to stormwater quality in unincorporated urban areas of Santa Barbara county. These changes are necessary as a result of the implementation of the U.S. EPA NPDES Phase II stormwater quality regulations. The changes are being completed in an effort to provide systematic, consistent, and complete review of existing land use ordinances, general plan elements (including the Local Coastal Plan), and development standards for new projects and redevelopment.

The changes currently underway will result in the creation of the CEQA thresholds and analysis procedures in relation to stormwater quality, thus allowing for more definitive impact analyses than are currently possible. In addition, in accordance with the CEQA, cumulative impact analyses would be completed for all cumulative projects in the watershed, before and subsequent to, development of such ordinances and thresholds. Appropriate mitigation measures would be applied to each cumulative project in an effort to reduce potentially significant water quality impacts to less than significant.

Although the various initiatives described above to minimize cumulative impacts to water quality are currently underway, they have not yet been finalized and implemented; therefore, no additional mitigation measures have been identified.